Joint Ventures Electronic Services (Pty) Ltd

1) **The Diamond Parking Guidance System - Sensor / ZoneBuffer / USB Gateway / Blockbuffer**

2) **PGS**

3) **Schematics**

4) **Trunking**

5) **Safety Test Report & Photos (Test Africa #: WCT 13/0646)**

6) **CE/E Declarations**

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The Diamond Parking Guidance System - Sensor

1. General

The Diamond PGS Sensor is an ultra sound range detector, designed to detect and indicate the status of one parking bay.

1.1 Main features

- Hi accuracy of 99.99%.
- Lowest power consumption in the industry - less then 300mW per unit.
- Bright, sharp space indicator with 360^{O} viewing angle.
- Lightning protection on all inputs and outputs.
- Status LED for easy fault detection.
- Hot swappable.
- Low cost.

1.2 Operation

The PGS Sensor emits an ultrasonic wave every 0.5 to 1.2 second and analyses the echo. A decision of whether a car is parked in the bay is made based on the echo level, size and timing. A bi-colour beacon indicator, typically Red/Green is then used to indicate the space availability.

The PGS Sensor communicates its detection mode to the ZoneBuffer to which it is connected, over its communication port.

The PGS Sensor is also equipped with status LED. The status LED indicates:

- Communication status
- Hardware status

This document must be read in conjunction with the “PGS Terminology.Pdf” available of our website.

2. Detailed description

2.1 Mounting options

The PGS Sensor is available in two mechanical versions:

- Hex Box PGS Sensor – The Hex Box PGS Sensor follows the industry standard of a stand-alone box that can be mounted straight on the ceiling, onto a cable tray or conduit junction.
- Trunking embedded PGS Sensor – The Trunking embedded PGS Sensor is an innovative way of combining the sensor and the cable Trunking. This system provides a low cost solution with aesthetically pleasing appearance. It is highly recommended for suspended applications but will also do well in a ceiling mount application

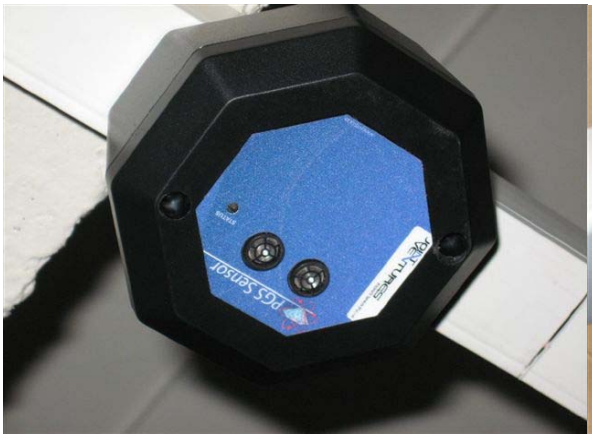
Both versions are electrically identical.

2.2 Combo / Split options

Each mounting option is available as a combo or as a split system option

- Combined Sensor/Indicator – Suitable in applications where there is free line of sight to the ceiling above the parking bays.

- Split Sensor/Indicator – Suitable in applications where obstacle such as support columns are obstructing the line of site to the sealing above the parking bays.



HexBox sensor only

Trunking embedded Indicator only

2.3 Indicator colour options

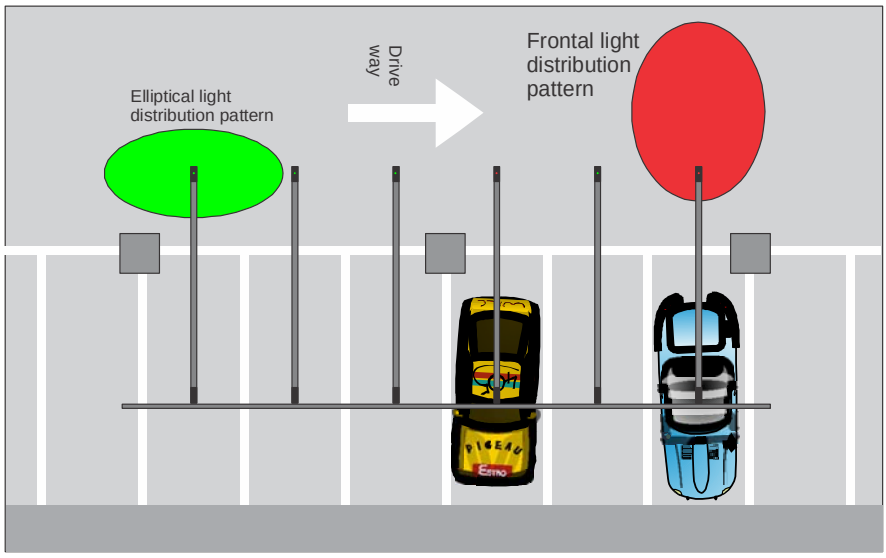
All the Sensor options, combined or split, are available in the following colour combinations:

- Red/Green
- Red/Blue
- Red/Yellow
- Red/While

The Various colours enable the zoning specific areas such as areas for allocated parking, disabled people parking, tenants parking etc.

2.4 Light distribution options

All versions are available in two light dispensation patterns:



Elliptical light distribution pattern – This pattern provides a clear 360^{O} visibility with emphasis along the driveway.

Frontal light distribution pattern - This pattern provides a clear 180^{O} visibility with emphasis perpendicular to the driveway. It is useful against direct sky light in windowed parking.

2.5 Indicator mode control

The indicator can be set to any of the following modes:

- Normal – Normal operation, indicating bay occupancy.
- Off – The indicator can be switched off completely.
- Red – The indicator can be forced to indicate occupied bay regardless of the bay status.
- Green - The indicator can be forced to indicate vacant bay regardless of the bay status.

In addition, each indicator can be set to blink.

The indicator mode is stored in a non-volatile memory.

2.6. Indicator intensity

Ultra high brightness oval LEDs are used in conjunction with a specially designed light diffuser and reflector create a clear and 360^{O} visibility angle with emphasis towards the driveway.

LED specifications

Colour	Max Luminous intensity	Total Luminous flux	Distribution angle
Red	1500 Mcd	4.5 Lumen	120 X 60 Degrees
Green	3300 Mcd	10 Lumen	120 X 60 Degrees
Blue	1500 Mcd	4.5 Lumen	120 X 60 Degrees
Yellow	1500 Mcd	4.5 Lumen	120 X 60 Degrees
White	5000 Mcd	15 Lumen	120 X 60 Degrees

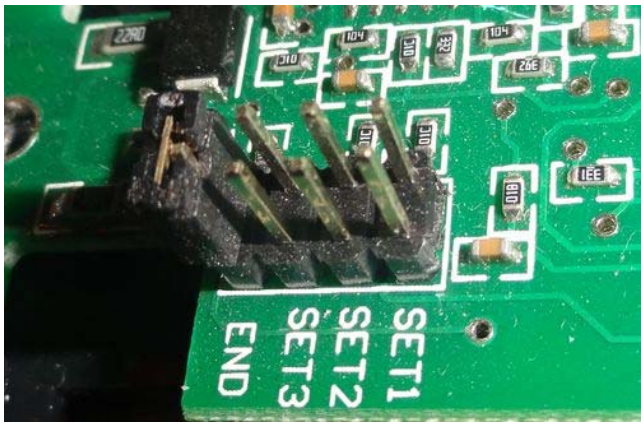
Max Luminous intensity – The intensity at the axis of the LED
Total Luminous flux – The total sum of the light emitted by the LED.
Distribution angle –The way the total light is distributed.

2.7 Intensity control

The intensity of each indicator can be set to one of 15 intensity levels. This can be done over the communication port. The intensity data is stored in a non-volatile memory.

2.8 Logic allocation of sensors

Using internal jumpers, up to 8 allocations can be defined for each sensor.



The following table summarises all the options

Jumper Code	SET1	SET2	SET3	Allocation	Relevant Numeric display
0	OUT	OUT	OUT	Section	Section
1	IN	OUT	OUT	Allocation 1	Allocation 1
2	OUT	IN	OUT	Allocation 2	Allocation 2
3	IN	IN	OUT	Allocation 3	Allocation 3
4	OUT	OUT	IN	Allocation 4	Allocation 4
5	IN	OUT	IN	Allocation 5	Allocation 5
6	OUT	IN	IN	Allocation 6	Allocation 6
7	IN	IN	IN	Slave	Total section count

Section – When no jumper is inserted, the sensor is allocated to the section it is in.

Allocation 1 to 6 – These can be used to guide drivers to allocated parking spaces such as:

- Disabled parking.
- VIP Parking.
- Hybrid bays
- Etc.

Once allocated the sensor will participate in the allocation count.

Slave – Slave allocated sensors do not participate in any count, instead they share the detection information with a master sensor so that wider arias may be covered.
Two PGS Sensors can be connected in a Master/Slave configuration in order to cover wide or long parking bays. This is required in the case of:

- Wide disabled parking bays
- Parallel parking bays

The combined Master/Slave will appear as single units at system level.

2.9 Communication options

The Diamond PGS sensor is available with two communication options:

- RS232 – This format enables the PGS sensor to be connected in a Daizzy chain system configuration.
- RS422 – This format enables the PGS sensor to be connected in a Daizzy chain system configuration using balanced communication line.
- RS485 - This format enables the PGS sensor to be connected in a multi-drop parallel system configuration.

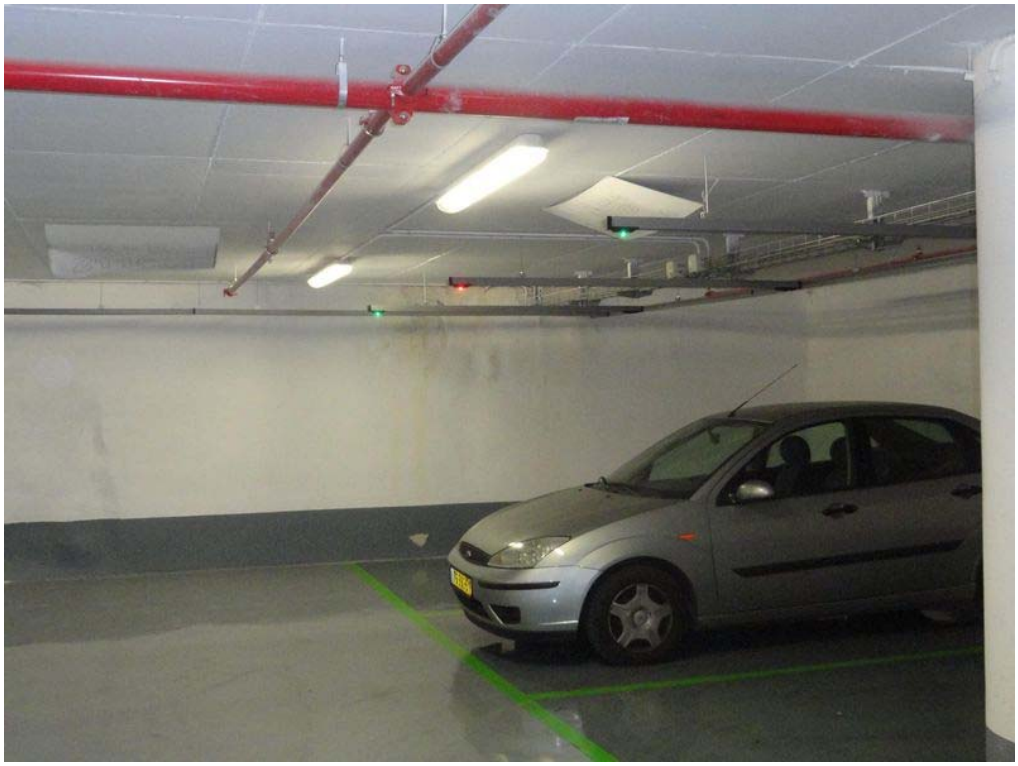
The protocols are available for any third party who wishes to develop its own PGS data collection system, utilising our trunking system. Contact us for more information

2.10 Status indicator

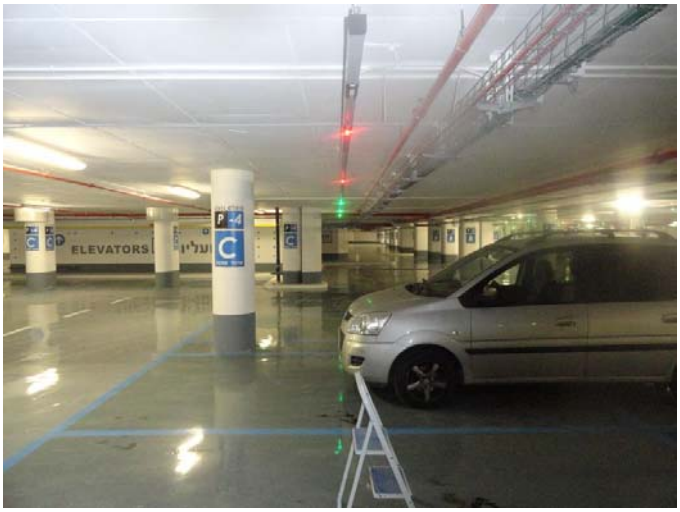
Each PGS sensor is equipped with Red/Green bi-colour status indicator LED. The status indicator provides information regarding the communication and the operation of the sensor as follows:

- The Status indicator blips green every second – Communication is received and the sensor functions properly.
- The Status indicator blips red every second - Communication is not received but the sensor functions properly.
- The Status indicator blips green then red every second - Communication is received but the sensor does not function properly.
- The Status indicator blips twice red every second - Communication is not received and the sensor does not function properly.

3. Application examples



The Diamond PGS Sensor picks up anything



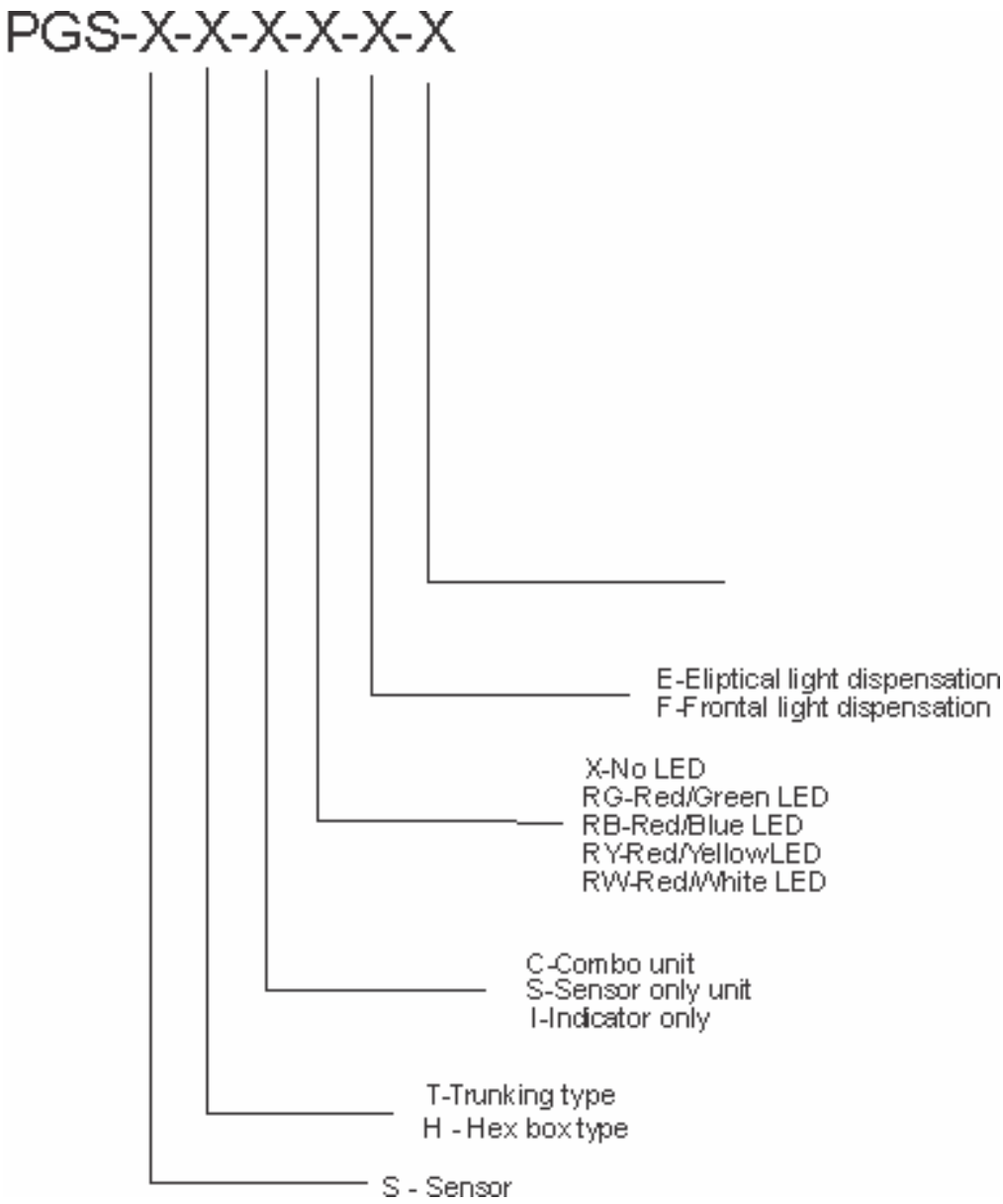
And anybody

4. PGS Sensor detailed specifications

The following specifications are applicable to all the versions and combinations as described above.

Power supply	15V-30V
Power consumption	Less than 300mW
Communication protocol	Daisy chain RS232
Detection range minimum	200mm
Detection range maximum	2000mm
Material	Polycarbonate
Housing	IP56
Mounting options for Hex-Box	
	Attached straight to the ceiling. Attached to conduit junction boxes. Suspended under metal/PVC cableway
Mounting options for the Trunking embedded PGS Sensor	
	Clip into the dedicated Trunking system
Operating temperature	-20^{O} to $+70^{O}$
Storage temperature	-40^{O} to $+85^{O}$
Safety Standard	IEC 60950-1
RFI/EMI Standard	IEC 61000

5. Ordering information:



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Diamond Parking Guidance System – ZoneBuffer

1. General

The Diamond PGS ZoneBuffer is the first line data communication hub of the system. It communicate via three communication ports:

- Downstream RS232 port
- Downstream RS485 port
- Upstream RS485 port

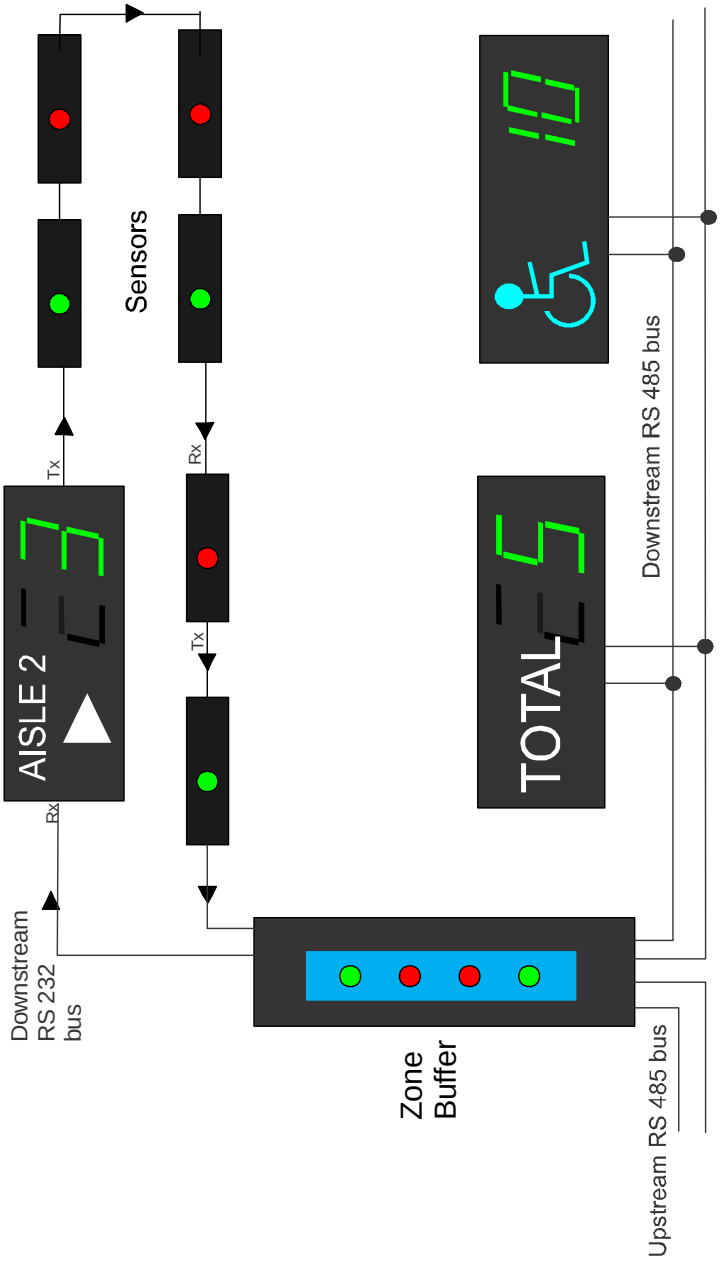
The ZoneBuffer main functions are:

- Collect data from the sensor array.
- Calculate the availability figures of each section, allocation and the total.
- Send data to downstream numeric displays.
- Compress the information and relay it upstream on request.
- Reduce commissioning effort to next to nil using its auto map feature.

Other features of the ZoneBuffer

- Lightning protection on all inputs and outputs.
- Clips into our dedicated trunking system for easy installation.
- Hot swappable.
- Low cost.

This document must be read in conjunction with the “PGS Terminology.Pdf” available of our website.



Typical application of ZoneBuffer

1.1 Main features of the ZoneBuffe

Each ZoneBuffer is capable of:

- Collecting data from up to 250 PGS Sensors.
- Each sensor may belong to:
    - One of 16 sections.
    - One of 6 allocations.
- Calculate the availably of parking of each section and of each allocation.
- Control up to 16 numeric displays connected to its RS232 port.
- Control up to 16 numeric displays connected to its downstream RS485 port.
- Each display may belong to:
    - One of 16 sections.
    - One of 6 allocations.
    - Total count

1.2 Operation

The ZoneBuffer operation can be divided to three main categories:

- Zone mapping.
- Zone controlling
- Zone data concentrator

Zone mapping

Mapping operation can be invoked either on the floor by inserting the MAP jumper or remotely over the communication line.

During Zone mapping, the ZoneBuffer scans both downstream ports for connected devices. The configuration of each detected device is then used to build a database of all sensors, numeric displays, sections and allocations.

The database is stored in a non-volatile memory and is fixed until another mapping command is received.

Zone controlling

The Zone controlling is done in three steps every 2 seconds as follows:

- Collect the status of all sensors
- Calculate the availability per each section, allocation and the total.
- Updated all relevant displays

Zone data concentrator

The ZoneBuffer also acts as data concentrator in respect of any device connected to its upstream RS485 port.

As data concentrator it:

- Compresses the sensor array status and relays it on request.
- Accepts commands to be relayed to its downstream devices.

Communication Status LED

The PGS ZoneBuffer is equipped with three bi-colour communication status LED.

- Downstream RS232 array communication status LED.
- Downstream RS485 communication status LED.
- Upstream RS485 communication status LED.

All communication status LEDs blink red on transmit and green on receive.

In addition to the communication status LEDs the ZoneBuffer indicates the general status of the devices connected to its downstream ports using two blinks:

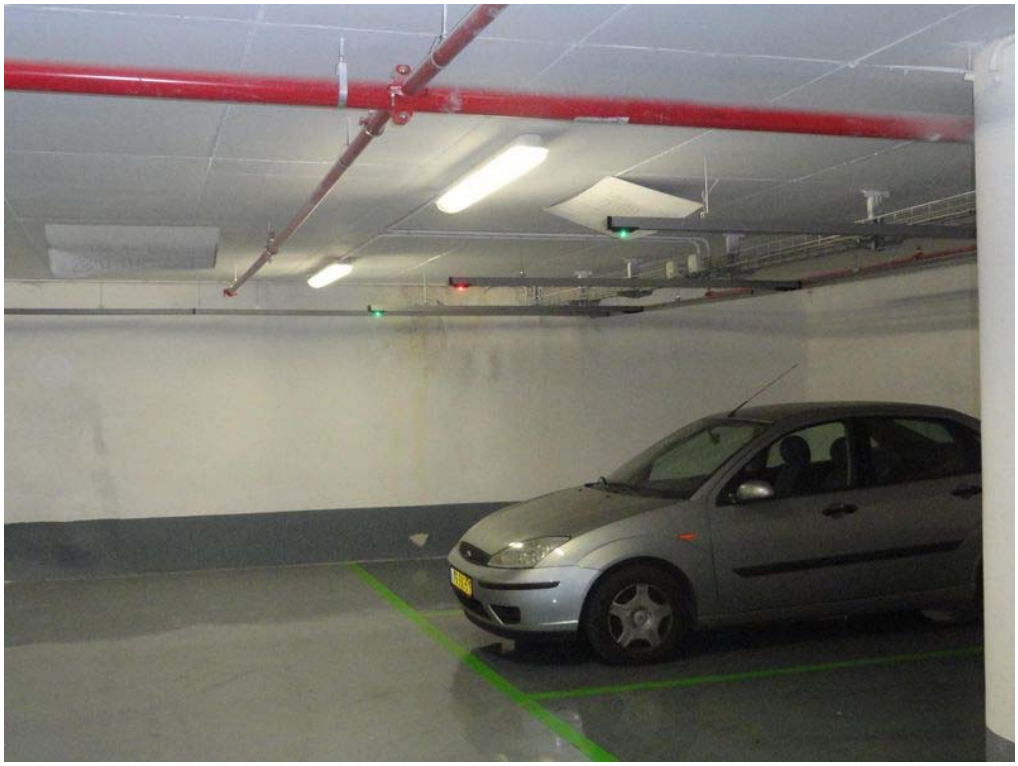
First blink:

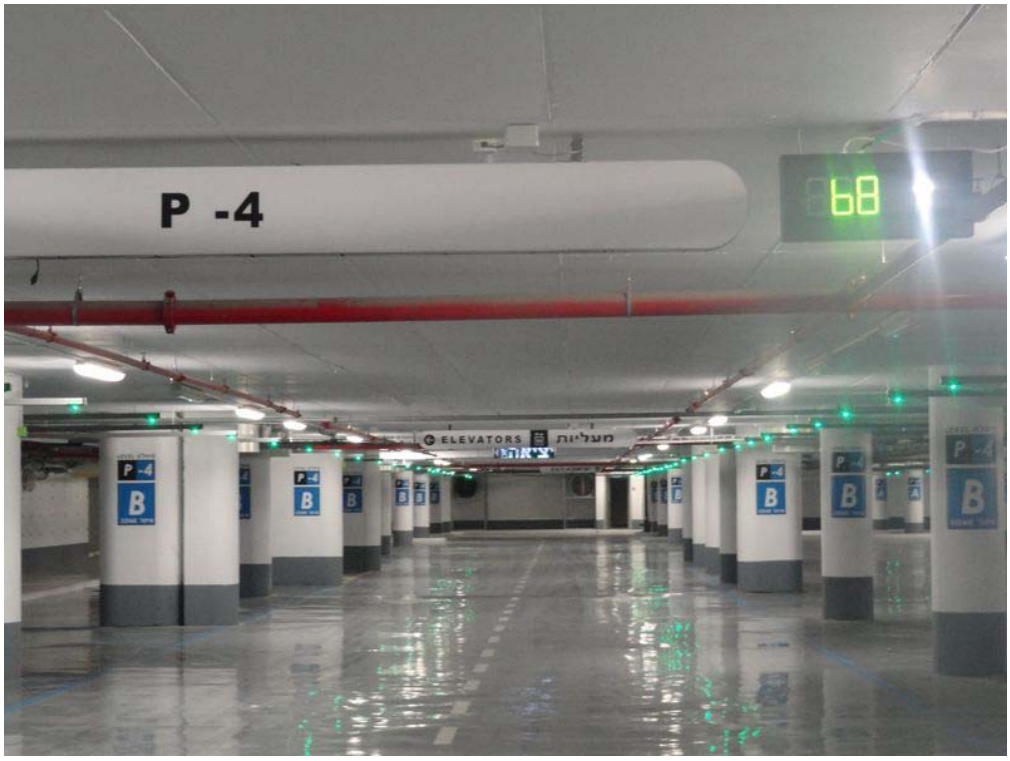
- Green - Downstream RS232 devices report OK.
- Red – At least one Downstream RS232 devices reports a fault.

Second blink:

- Green - Downstream RS485 devices report OK.
- Red – At least one Downstream RS485 devices reports a fault.

3. Application examples





Total availability is calculated and displayed by the ZoneBuffer

4. ZoneBuffer detailed specifications

Power supply	15V-30V
Power consumption	Less than 300mW
Downstream Array Communication protocol	Daizzy chain RS232
Downstream Communication protocol	Multi-drop addressed RS485
Upstream Communication protocol	Multi-drop addressed RS485
Material	Polycarbonate
Housing	IP56
Mounting	**C**lip into trunking system
Operating temperature	-20^{O} to $+60^{O}$
Storage temperature	-40^{O} to $+85^{O}$
Safety Standard	IEC 60950-1
RFI/EMI Standard	IEC 61000

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The Diamond Parking Guidance System – USB Gateway

1. General

The Diamond PGS Gateway is the USB to the Diamond Parking Guidance System adaptor.

1.1 Main features

- Plug & Play - Automatically detected and configured.
- Bus powered, requires no external power supply.
- Lightning protection on all inputs and outputs.
- Status LED for easy fault detection.
- Hot swappable.
- Low cost.

1.2 Operation

The PGS Gateway is a dedicated USB to RS485 converter.

The ControlRoom application communicates with and controls the Diamond Parking Guidance System via the PGS Gateway.

The PGS Gateway is equipped with communication status and power LED.

This document must be read in conjunction with the “PGS Terminology.Pdf” available on our website.

2. Detailed description

2.1 USB Isolation

The Diamond PGS Gateway provides galvanic isolation between the ControlRoom PC and the system. The isolation provides better safety and higher noise immunity on the typically long communication lines between the system and ControlRoom.

2.2 Communication

The communication hardware is a standard, multi-drop RS485 communication.

2.3 Detection and configuration

A unique identification written into the PGS Gateway enables its automatic detection and configuration by the ControlRoom application.

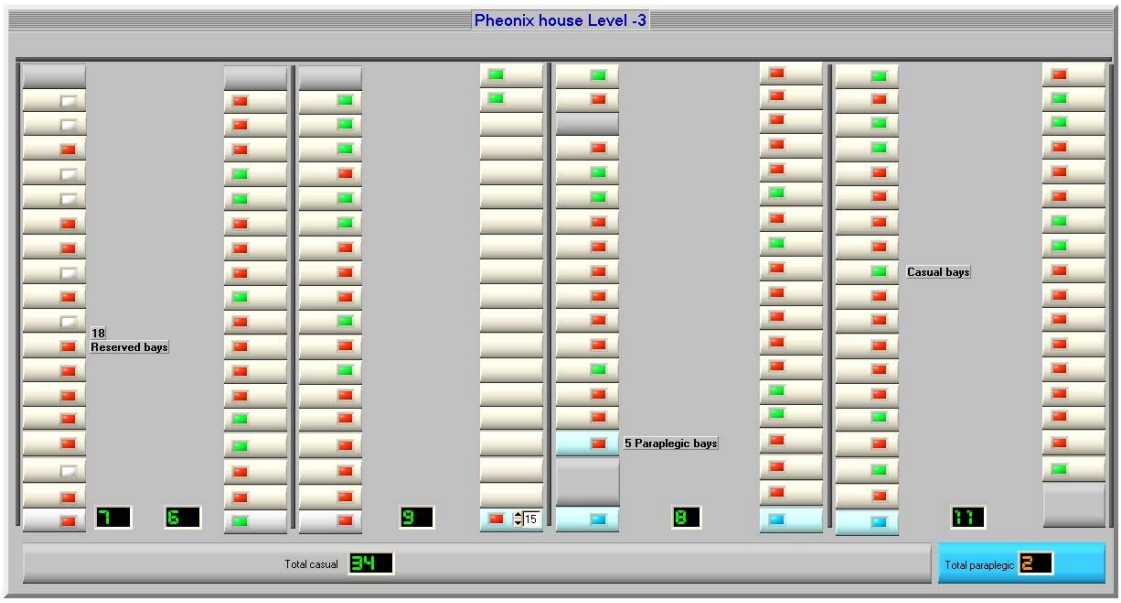
2.4 Status indicator

Each PGS Gateway is equipped with three LED indicators. The indicators provides information regarding the communication and the operation of the Gateway as follows:

- Power indicator – Green LED indicates that the PGS Gateway is connected to a USB port and that the internal power supply is operational.
- Transmit indicator – Red LED blinks whenever the device sends data to the system.
- Receive indicator – Yellow LED blinks whenever the device receives data from the system

3. Application examples

Typical site



Typical ControlRoom site presentation

4. PGS Gateway detailed specifications

Power supply	USB Bus powered
Power consumption	Less than 300mW
Communication protocol	RS485
Material	ABS
Housing	IP56
Operating temperature	-20^{O} to $+70^{O}$
Storage temperature	-40^{O} to $+85^{O}$
Safety Standard	IEC 60950-1
RFI/EMI Standard	IEC 61000

5. Ordering information:

PGS-Gateway

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Diamond Parking Guidance System – BlockBuffer

1. General

The Diamond PGS BlockBuffer is the Second line data communication hub of the system. It communicates via two communication ports:

- Downstream RS485 port
- Upstream RS485 port

The BlockBuffer main functions are:

- Collect data from up to 16 BlockBuffers connected to its downstream RS485 port.
- Calculate the availability figures of each allocation and the total of the entire system.
- Send data to downstream numeric displays.
- Compress the information and relay it upstream on request.
- Reduce commissioning effort to next to nil using its auto map feature.

Other features of the BlockBuffer

- Lightning protection on all inputs and outputs.
- Clips into our dedicated trunking system for easy installation.
- Hot swappable.
- Low cost.

This document must be read in conjunction with the “PGS Terminology.Pdf” available of our website.

1.1 Main features of the BlockBuffer

Each BlockBuffer is capable of:

- Collect data from an array of up to 16 ZoneBuffers connected to its downstream RS485 port.
- Calculate the availably of parking of each allocation and the total of the entire array.
- Control up to 16 numeric displays connected directly to its downstream RS485 port.
- Control up to 16 numeric displays per ZoneBuffer via the ZoneBuffers downstream RS485 ports.
- Control up to 16 numeric displays per ZoneBuffer via the ZoneBuffers downstream RS232 port.
- Each display may be allocated to:
    - One of 6 allocations.
    - Total count

1.2 Operation

The BlockBuffer operation can be divided to three main categories:

- Block mapping.
- Block controlling
- Block data concentrator

Block mapping

Block mapping operation can be invoked either on the floor by inserting the MAP jumper or remotely over the communication line.

During Block mapping, the BlockBuffer scans its downstream ports for connected devices. The devices may be:

- ZoneBuffers.
- Numeric Displays.

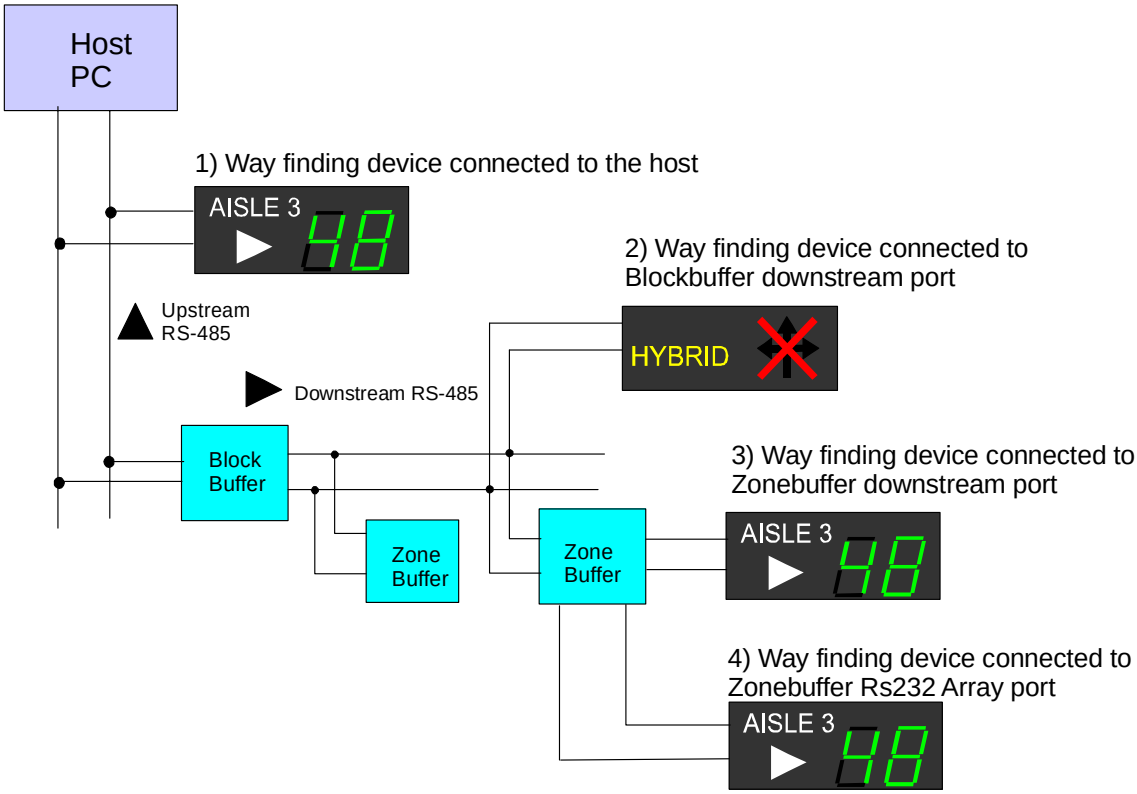
If a ZoneBuffer is found the BlockBuffer will also obtain the information regarding all the devices connected to the ZoneBuffer's downstream ports.

The configuration of each detected device is then used to build a database of numeric displays and their allocation.

The database is stored in a non-volatile memory and is fixed until another mapping command is received.

Using this database the BlockBuffer sends relevant information to all the numeric displays that have been assigned to its control.

The following drawing illustrates a typical connection of a BlockBuffer.



There are 4 logical points to which a way finding device can be connected to:

1. To the host.

2. To the downstream port of any BlockBuffer together with the BlockBuffers. Such way finding device is controlled by default as follows:
   - REM Jumper is inserted - By the host.
   - REM Jumper is not inserted - By the BlockBuffer.

3. To the downstream port of any BlockBuffer. Such way finding device is controlled by default as follows:
   - REM Jumper is inserted - By the upstream device, BlockBuffer or Host.
   - REM Jumper is not inserted - By the BlockBuffer.

4. To the RS232 array port of any BlockBuffer. Such way finding device is controlled by default as follows:
   - REM Jumper is inserted - By the upstream device, BlockBuffer or Host.
   - REM Jumper is not inserted - By the BlockBuffer.

Block controlling

The Block controlling is done in three steps every 2 seconds as follows:

- Collect the status of all sensors from all the ZoneBuffers on the downstream port.
- Calculate the availability per each allocation and the total availability of the entire block.
- Updated all relevant displays, each via its applicable port.

Zone data concentrator

The BlockBuffer also acts as data concentrator in respect of any device connected to its upstream RS485 port.

As data concentrator it:

- Compresses the sensor array status and relays it on request.
- Accepts commands to be relayed to its downstream devices.

Communication Status LED

The PGS BlockBuffer is equipped with two bi-colour communication status LED.

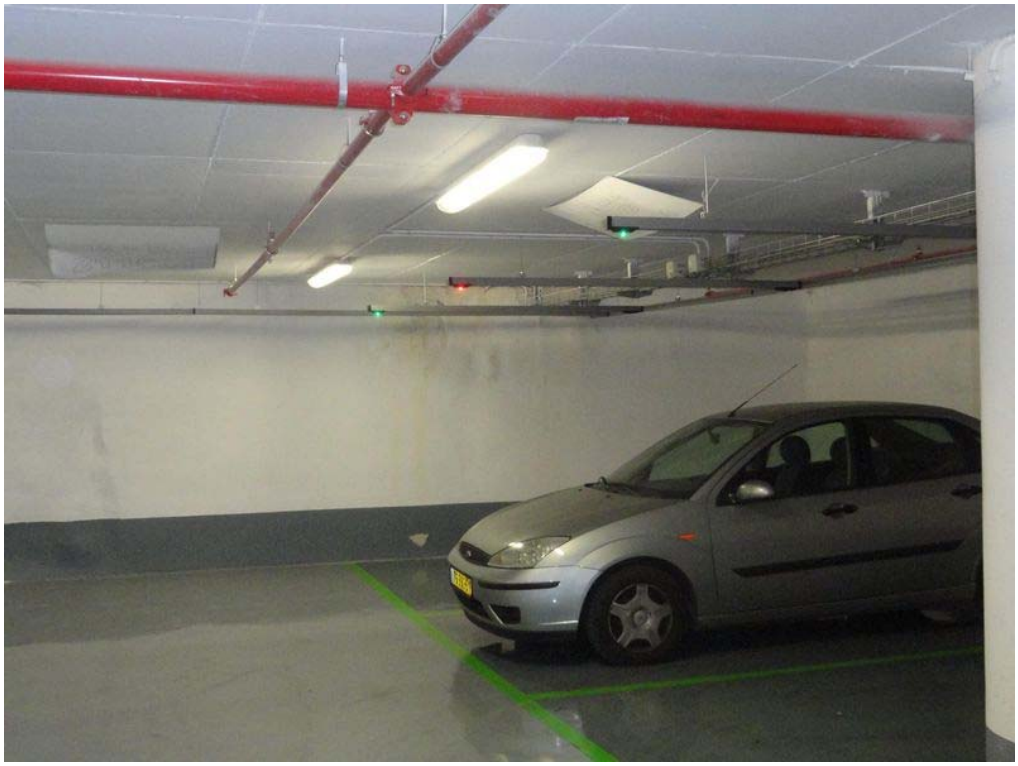
- Downstream RS485 communication status LED.
- Upstream RS485 communication status LED.

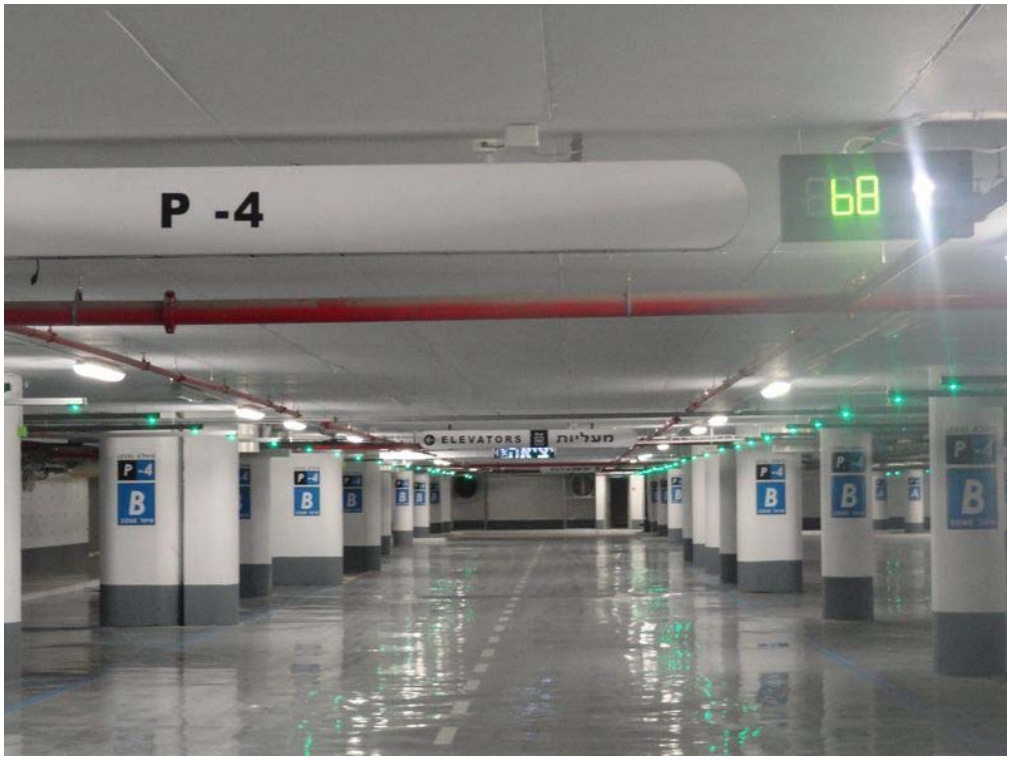
All communication status LEDs blink red on transmit and green on receive.

In addition to the communication status LEDs the BlockBuffer indicates the general status of the devices connected to its downstream port:

- Blink green - Downstream devices report OK.
- Blink red – At least one downstream devices reports a fault.

3. Application examples





Total availability is calculated and displayed by the BlockBuffer

4. BlockBuffer detailed specifications

Power supply	15V-30V
Power consumption	Less than 300mW
Downstream Array Communication protocol	Daizzy chain RS232
Downstream Communication protocol	Multi-drop addressed RS485
Upstream Communication protocol	Multi-drop addressed RS485
Material	Polycarbonate
Housing	IP56
Mounting	**C**lip into trunking system
Operating temperature	-20^{O} to $+60^{O}$
Storage temperature	-40^{O} to $+85^{O}$
Safety Standard	IEC 60950-1
RFI/EMI Standard	IEC 61000

5. Ordering information:

PGS-BlockBuffer

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PGS – Terminology

Motivation

Parking Guidance Systems are gaining popularity. Already we see that the architects specify these systems at the design stage and retrofit inquiries and installations are on a steady growth.

Unfortunately, to date there is no industry-dedicated standard that will insure uniformity and quality of Parking Guidance Systems across the various systems and vendors.

This results in a variety of systems with different design philosophies and with different terminology that makes it difficult to compare and discus the various technical documents.

The following document details the major building blocks of any Parking Guidance System with a brief description. These terms are used throughout the JVES PGS documents.

PGS Building blocks

Sensor – A sensor is a device, Mounted above or below a parking bay, capable of detecting the presence of a vehicle in the bay and relay the information up stream.

Space indicator – A single bay LED indicator with at list two colors indicating whether the bay or group of bays are free or occupied.

Zone Counter – Any device mounted above or below a driveway capable of counting the number of vehicles passing through the driveway.

Way finding device – Any device used to guide drivers to an available parking bay. These may be:

- Numeric displays
- Guiding arrows.
- No entry signs
- Etc.

Geographical definitions

Section – A small parking area, which can be geographically defined with a few entrance and exit points. An example will be an aisle with a driveway and parking bays on both its sides will be a section.

Zone – A larger area made of a few sections. The size of a zone is limited by the handling capability of the first level data interface device.

Block – A large area, consisting of a few section and/or zones, which can be geographically defined with a few entrance and exit points. An example will be an entire parking lot or an entire level.

Allocation – A parking bay or a group of parking bays allocated to a specific kind of users such as paraplegic, visitors, hybrids etc.

Parking bay measurements

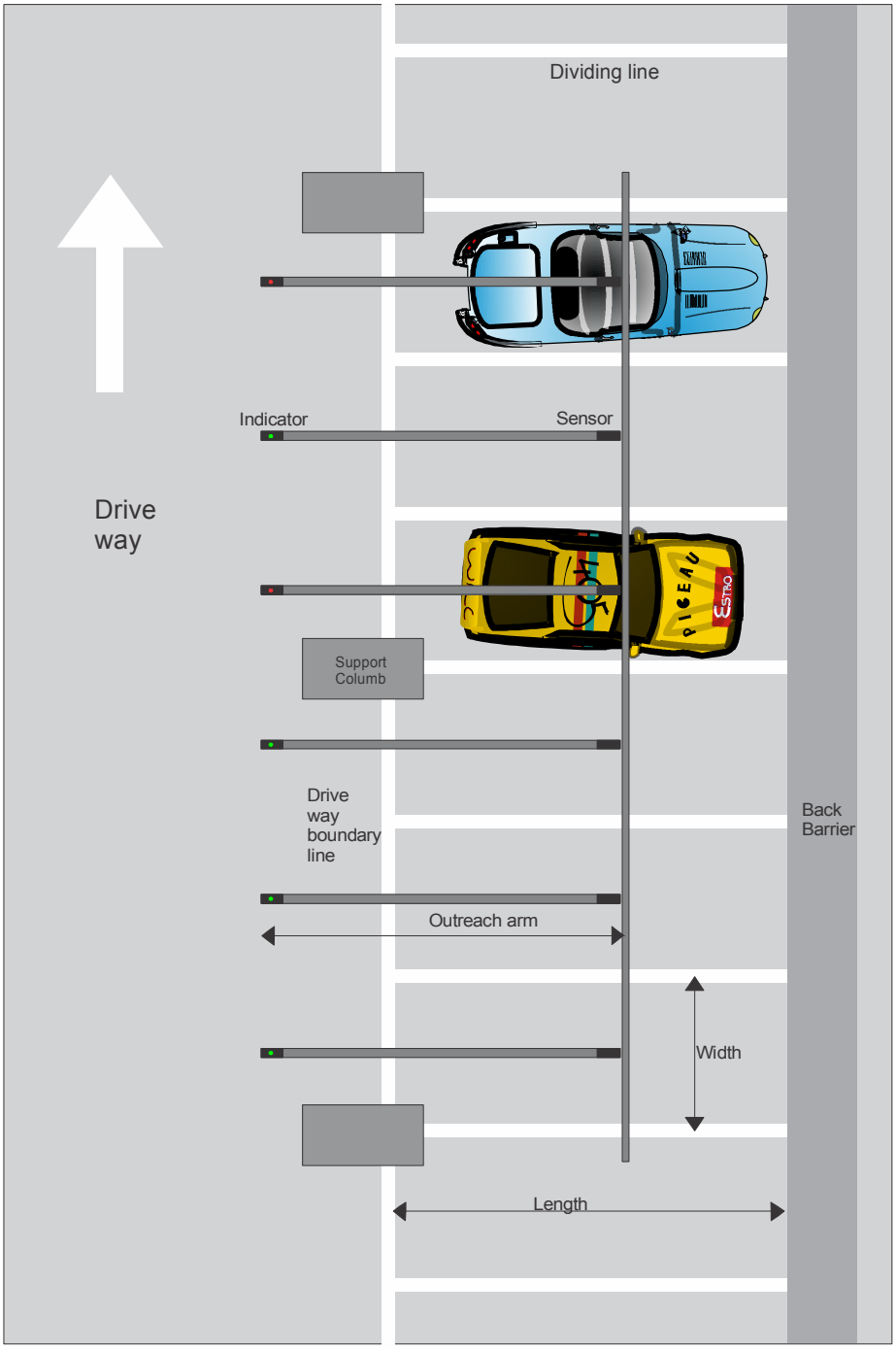
Please refer to the drawing in the following page for the bay definitions.

Parking bay or **Bay** for short – a single vehicle parking space

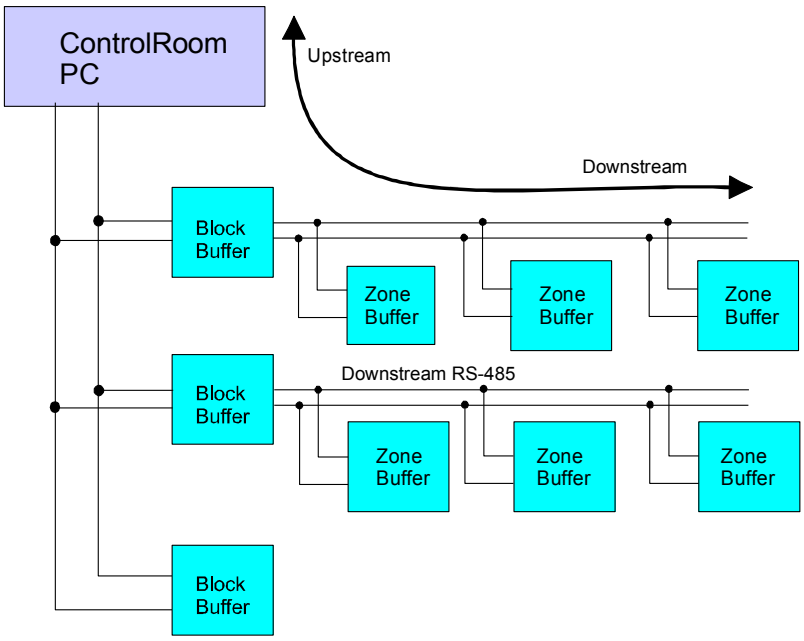
Bay width – The distance between the centers of the dividing lines.

Bay length – The length of the bay from the back barrier (Marking, pavement or wall) to the end of the Driveway boundary line.

Outreach arm – In a case of a split system, the distance from the middle of the parking bay to the best visible point in the driveway.



Data Communication and management devices



Zone Buffer – First-level data communication hub. The Zone Buffer connects directly to the front line system devices such as Sensors, ZoneCounters and/or Way Finding devices. It collects the data from these devices relay this data to an upstream device such as, a Block Buffer or ControlRoom. It may also have local intelligence and may be capable of compressing the data and /or generate commands to be sent downstream to a way finding devices.

Block Buffer - Second-level data communication hub. A Block Buffer connects to a few Zone Buffers and/or other front line system devices such as ZoneCounters and/or Way Finding devices. It collects the data from these devices and generates or relay commands to these devices upstream, generally to the Control Room. It may also have local intelligence and may be capable of compressing the data and /or generate commands to be sent downstream to a way finding devices.

ControlRoom – Last-level data center. Generally, a PC that can display the parking status at real-time. In most cases the control room:

- Collects all the data from all the sensors and from the Zone Counters.
- Display the site status on large format screen. Generally on a geometrical
- Generated date for the way finding devices.
- Logs movements.
- Generates statistical reports as graphs and/or reports.

Other definitions

Device – Any device connected to the communication bus

Upstream – Communication flow from lower device to upper device. For example, ZoneBuffer to BlockBuffer.

Downstream - Communication flow from upper device to lower device. For example, ControlRoom to BlockBuffer.

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Diamond PGS – Numeric display

General description

The main purpose of any Parking Guidance System is to assist drivers find their way to an available parking space, preferably close destination of the driver.

Numeric displays, placed on main intersections, provide the best method of way finding aid. They give the driver a real time picture of all the parking options, enabling drivers to make an informed decision based on the availability and destination.

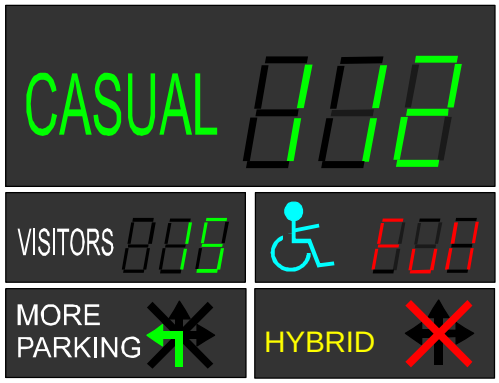
This document must be read in conjunction with the "PGS Terminology.Pdf". Another recommended document is the "PGS Way finding issues.Pdf". Both documents are available of our website.

1.1 Main features

- The Diamond PGS Numeric Displays are system-dedicated displays designed to easily integrate with the system. Large number of displays, showing availabilities of various sections and allocations can be supported without any commissioning effort.
- The Diamond PGS Numeric displays are available in 2, 3 or 4 digits.
- The Diamond PGS Numeric displays are available in 100mm or 200mm digit height.
- Each display has got two areas:
  - Static display with fixed message.
  - Dynamic display with seven segment numbers.

- Both static and dynamic areas are remotely dimmable.

- The static display area is used to describe the applicability of the numeric display.
    - LED back illumination.
    - Messages and shapes cut to customer requirements.
    - Available in any colour.
- The dynamic display area is used to display the actual availability figure.
    - Bicolour LED creating green orange and red colour coded messages.
    - Displaying the word “Full” for zero parking available.
- Modular system – Large signs with a few numeric display can be easily constricted



- Communication options:
    - RS232 for array connection.
    - RS485 for multi-drop connection.
- Lightening protection on all communication inputs.
- IP56, powder coated steel enclosure.
- Low cost.

2. Detailed description

2.1 Set-up

The Numeric display can be set-up using a set of jumpers.

2.1.1 END Jumper

The ZoneBuffer reads the status of the END jumper during MAP operation. If installed the Numeric display marks an end of a section.

2.1.2 Numeric allocation jumpers

The ZoneBuffer reads the status of the END jumper during MAP operation. The status of the set jumpers determines the data that will be sent to the Numeric display as follows:

SET1	SET2	SET3	Function
OUT	OUT	OUT	Section allocated
IN	OUT	OUT	Allocation 1 Normally used for paraplegic
OUT	IN	OUT	Allocation 2 Normally used for reserved parking
IN	IN	OUT	Allocation 3 Normally used for Hybrid bays
OUT	OUT	IN	Allocation 4
IN	OUT	IN	Allocation 5
OUT	IN	IN	Allocation 6
IN	IN	IN	Total count

2.1.3 REM Jumper

The ZoneBuffer reads the status of the REM jumper during MAP operation. If installed the ZoneBuffer will relay the status upstream passing the control of the Numeric display to the upstream device, usually a BlockBuffer. The ZoneBuffer will then wait for the numeric data to be received before it will update the Numeric.

Using this logic, a Numeric display can be connected to the existing ZoneBuffer array with out the need to add special wire to the upstream device.

2.1.4 DIG0 DIG1 Jumpers

The DIG0 and DIG0 are used to indicate to the system the number of digits of the numeric display as follows:

DIG1	DIG0	Function
OUT	IN	2 Digits display
IN	OUT	3 Digits display
IN	IN	4 Digits display

2.1.5 485 Jumper

This jumper is a communication protocol selector as follows:

Jumper out – The Numeric display applies the RS232 daizzy chain protocol.
Jumper in - The Numeric display applies the RS485 multi-drop protocol.

2.1.6 Setting RS485 address.

If no action is taken, the RS485 address is defaults to 0. If more then one display unit needs to be connected to the same bus, each will have to be given a unique address. The address space must be continues, i.e. 0,1,2,3 … up to 15. If an address is skipped, the units with address higher the last before the gap will not be recognised.

The address is set during commissioning and stored in EEPRPOM as follows:

1. Remove both DIG0 and DIG 1 jumpers. This indicates no digits, which is an illegal state.
2. Set the RS485 address as required with jumpers in DES/A0, DES/A1 and DES/A2 and REM/A3 as follows:
3. Apply power to the unit.
4. The LED will rapidly blink Red/Green.
5. The address will be displayed on the main numeric display.
6. Switch off the power.
7. Apply the DIG0 and DIG1 as per the original setting.
8. Apply allocation jumpers as required.

2.2 Status indicator

2.2.1 Status LED

Each PGS Numeric Display is fitted with Red/Green bi-colour status indicator LED. The status indicator is located inside the MSB of the main display.

The status indicator provides information regarding the operation of the unit using three blips as follows:

Blip 1:
- Green – Communication is received but the unit finds no applicable numeric data.
- Red – The unit receives no communication of any sort.

Blip 2:
- Green – Numeric data is received.
- Red – No numeric data is received.

Blip 3:
- Green – No internal fault is detected.
- Red – Internal fault is detected.

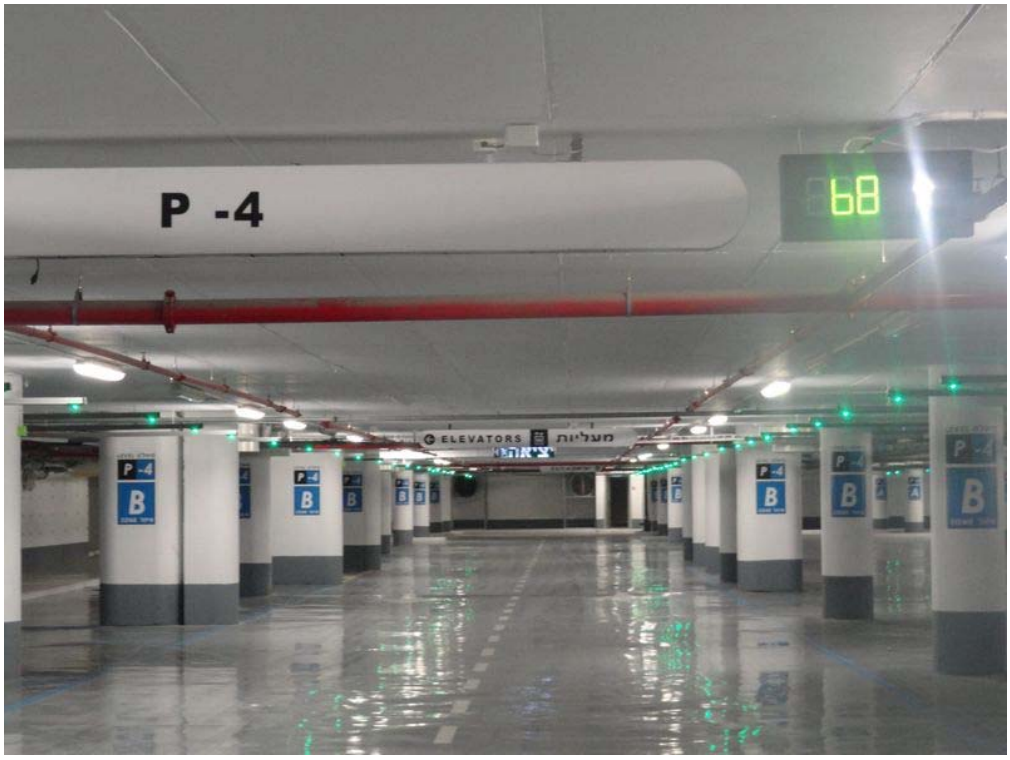
2.2.2 Fault indication using the display

The display is also used to indicate fault as follows”

1. Red bars – The unit receives no communication of any sort.
2. Orange bars – Communication is received but the unit finds no applicable numeric data.

3. Application examples

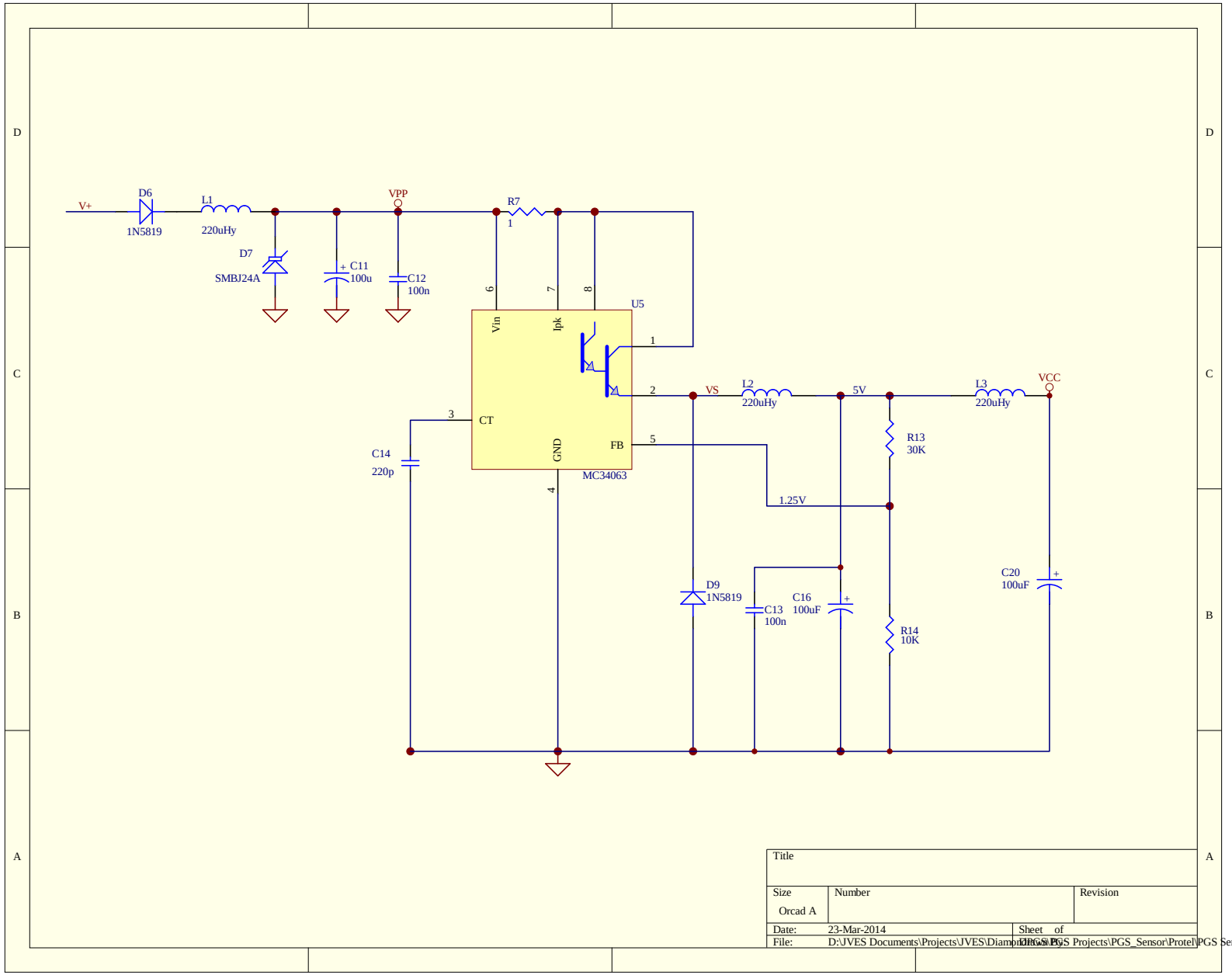

28

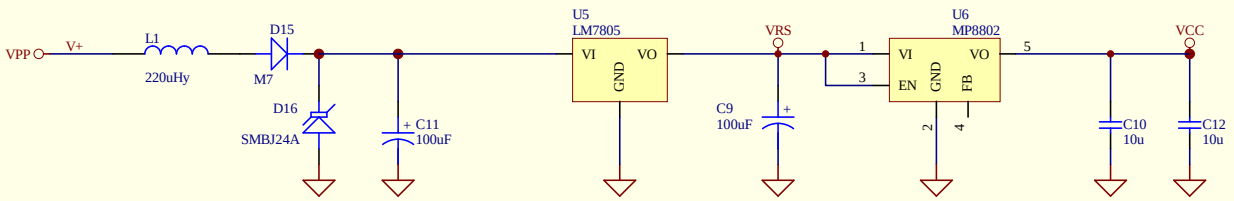

P -4
68
ELEVATORS
מעליות

4. Numeric Displays specifications

The following specifications are applicable to all the versions.

Power supply – System	15V-25V
Power consumption - System	Less then 200mW
Main supply	85VAC-250VAC
Main supply – Backlight and 3 Digits displaying 888	25W
Communication protocol	Daisy chain RS232
Communication protocol	Multi d-Drop RS485
Housing type	Powder coated mild steel
Housing rating	IP55
Operating temperature	-20^{O} to $+70^{O}$
Storage temperature	-40^{O} to $+85^{O}$
Safety Standard	IEC 60950-1
RFI/EMI Standard	IEC 61000





Title		
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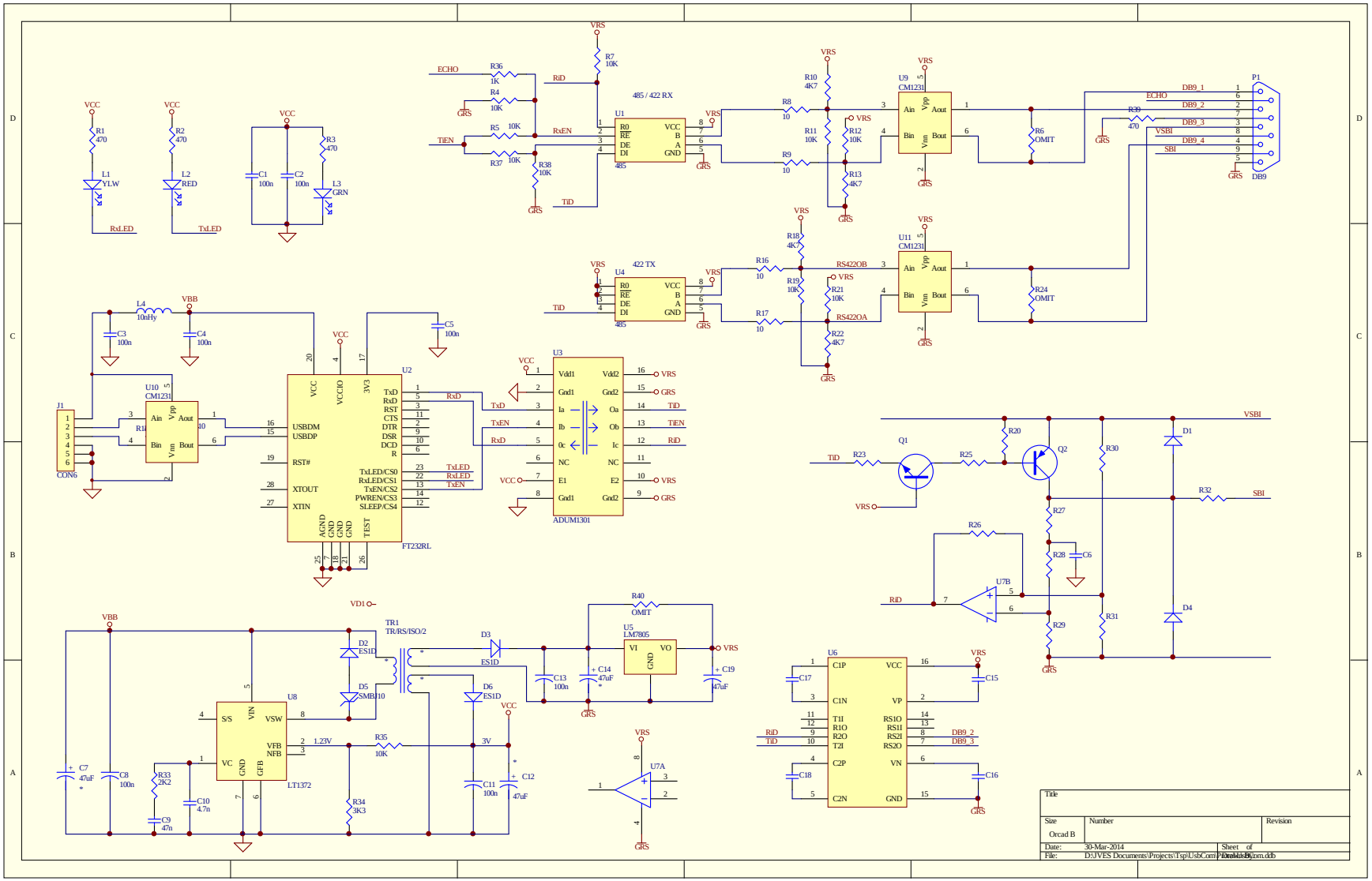
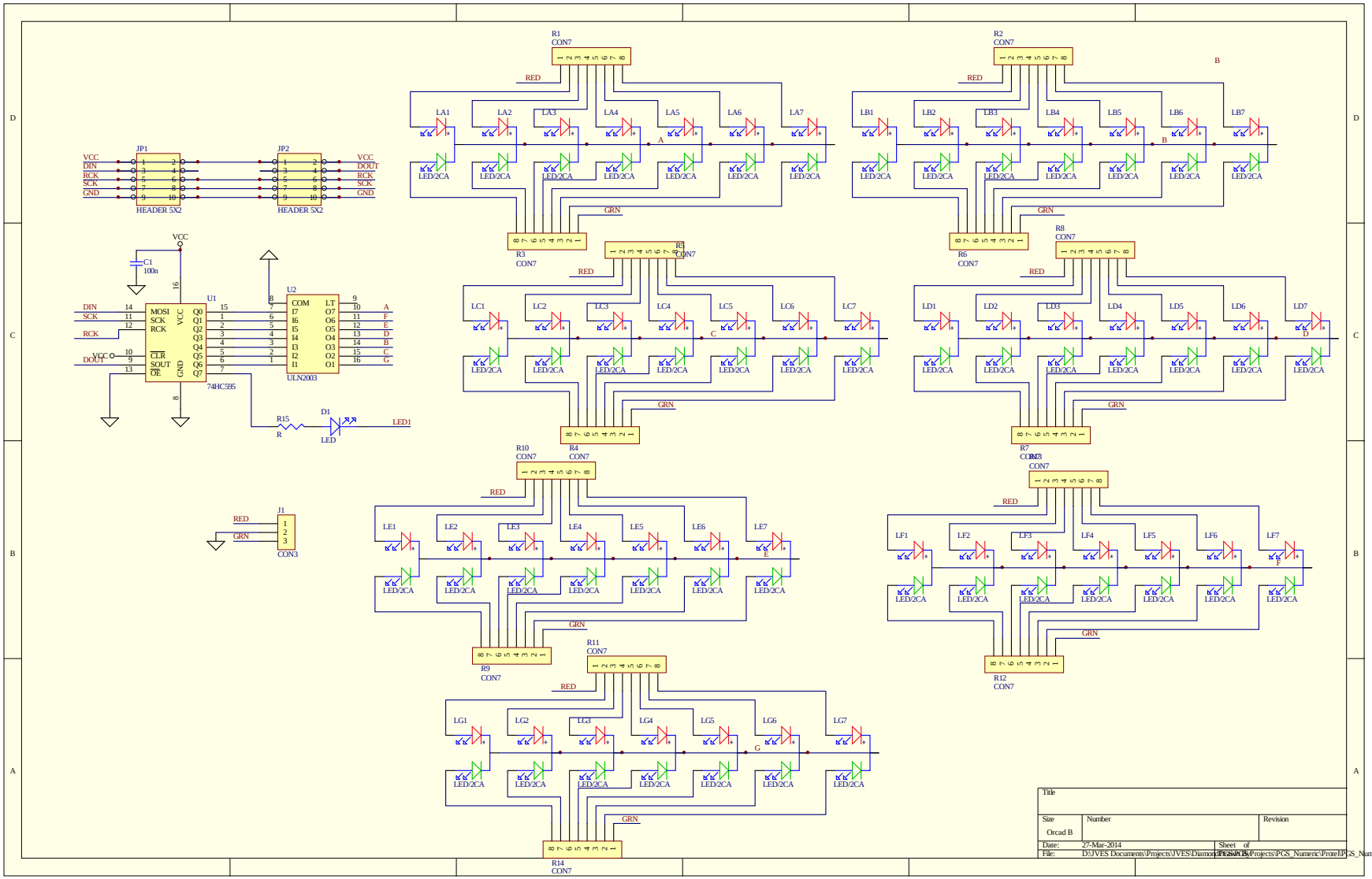
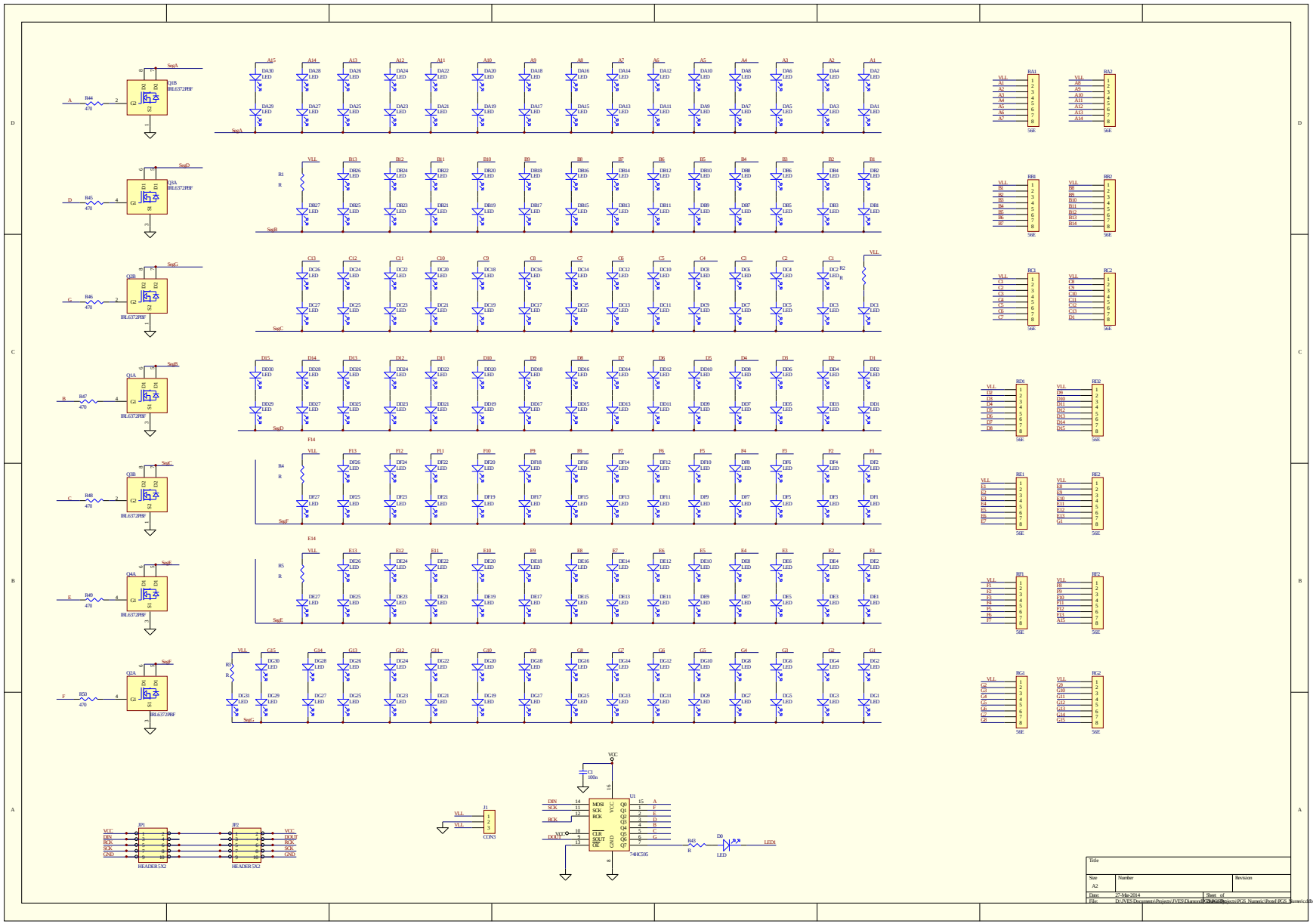
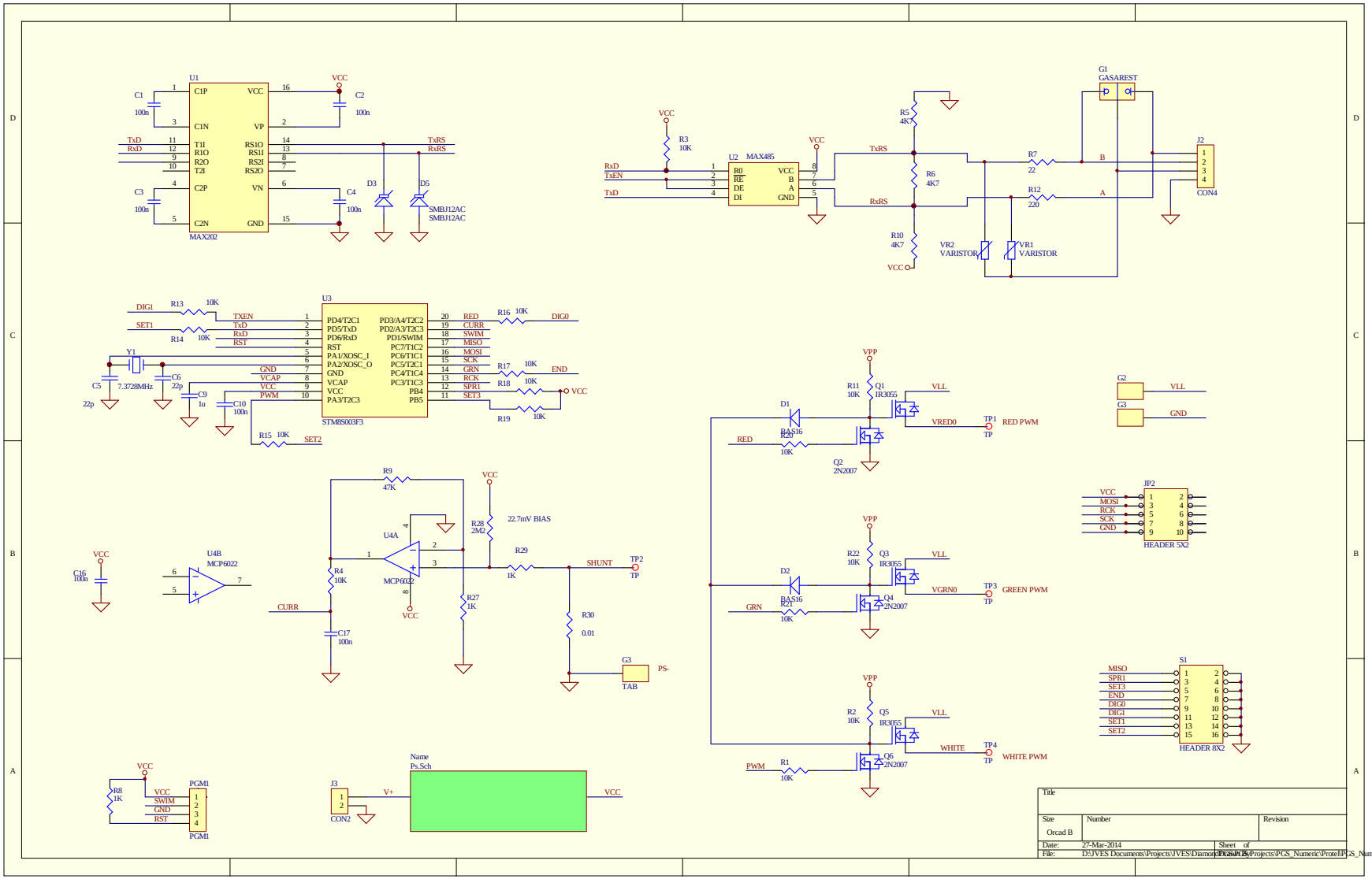
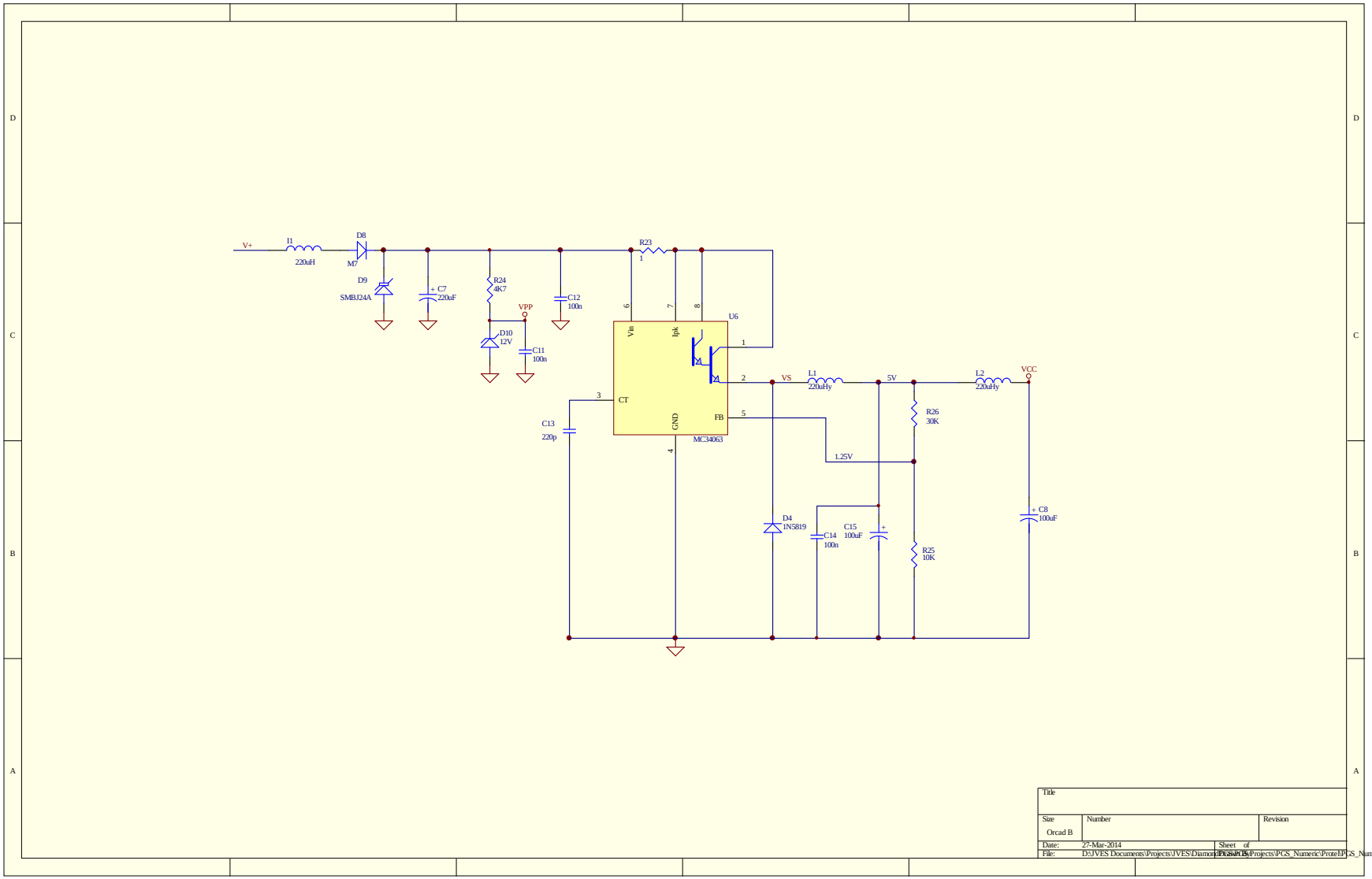
Date: 25-Mar-2014	Sheet of	
File: D:\JVES Documents\Projects\JVES\Diamond\PGS Projects\PGS_ZoneBuffer\Pjotel\ZoneBuffer.ddb		

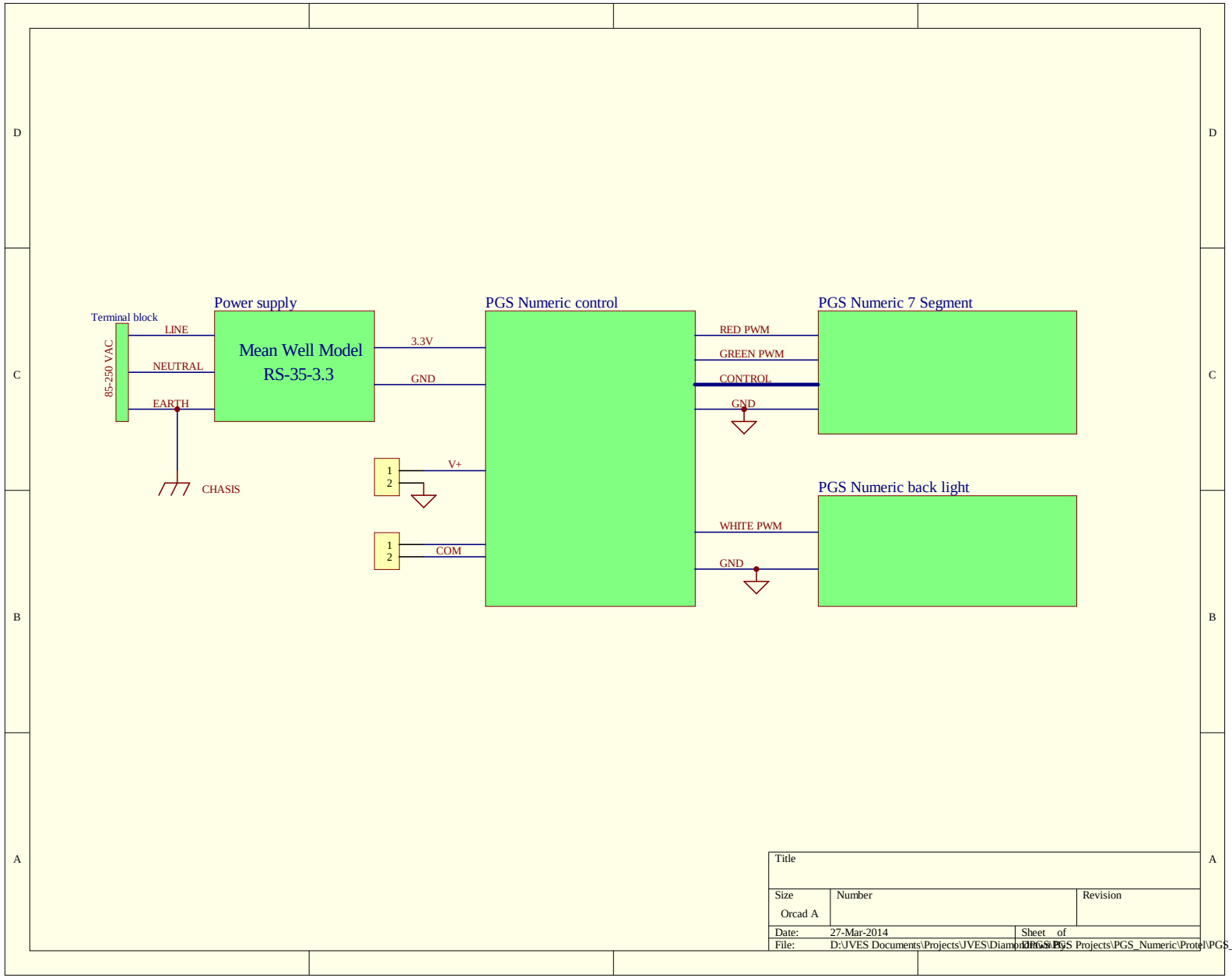


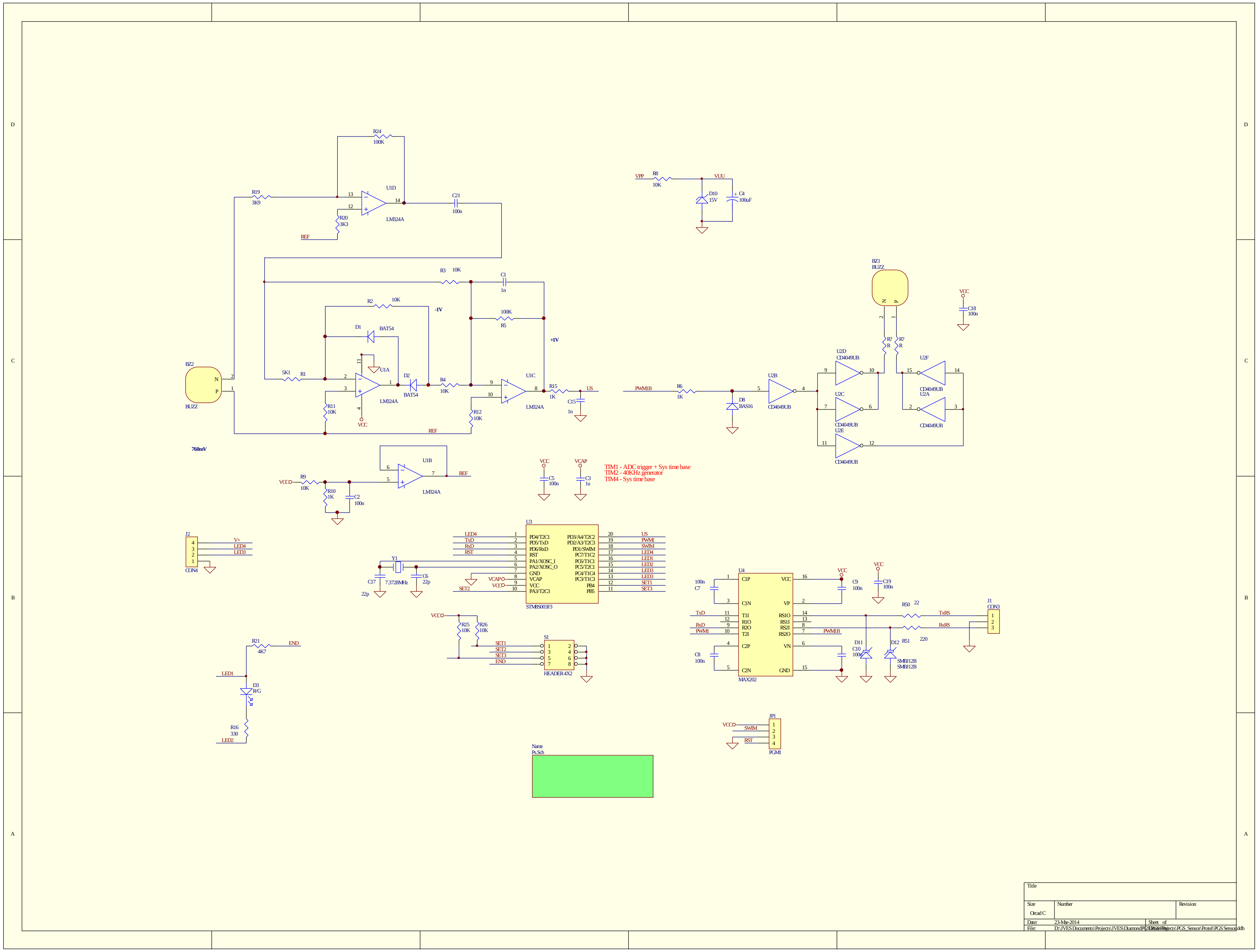


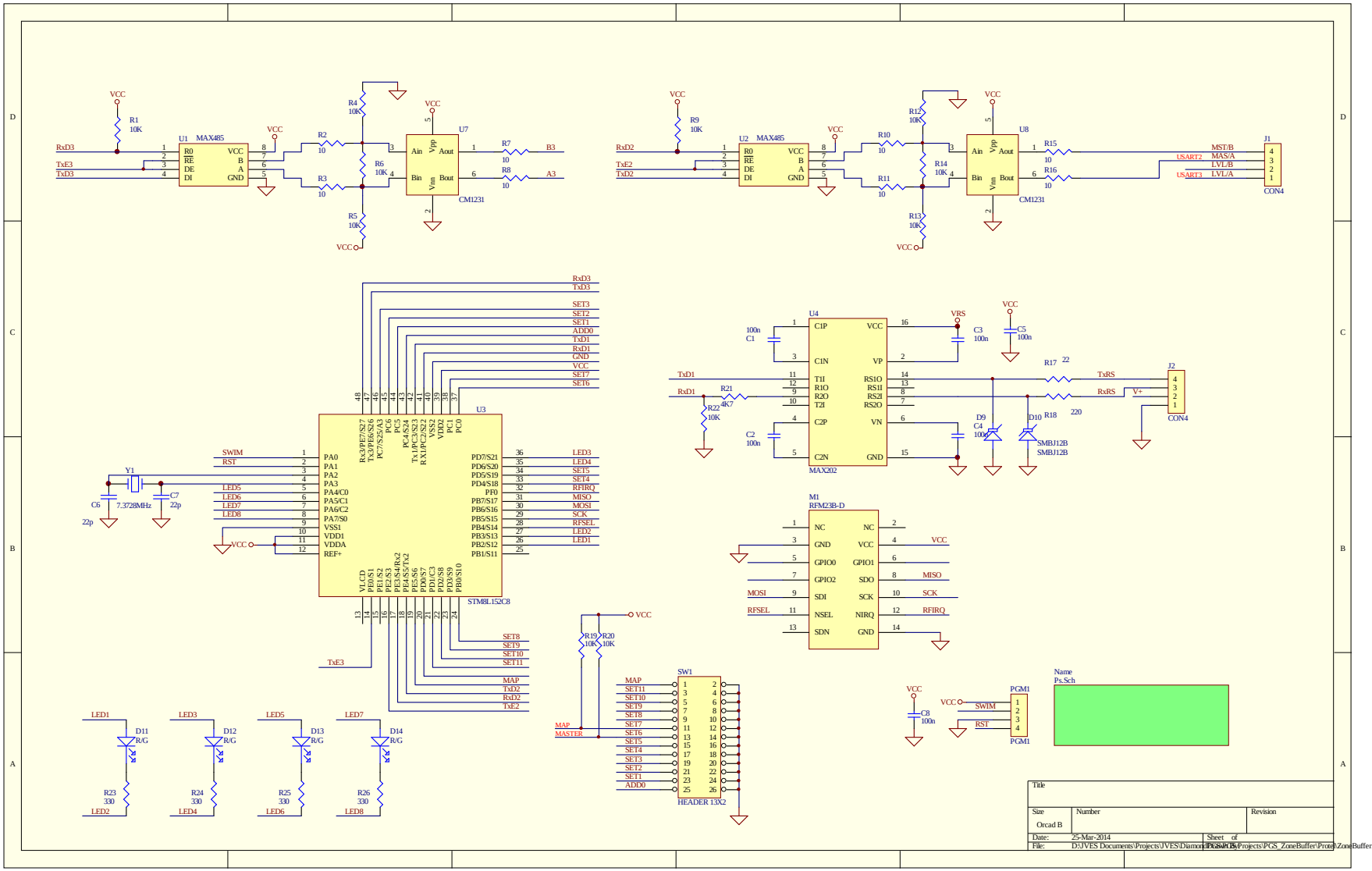












DuPont™ Ti-Pure® R-900

TITANIUM DIOXIDE

Product Description

DuPont™ Ti-Pure® R-900 is a rutile titanium dioxide pigment manufactured by the chloride process for general interior coatings applications. It is a fine dry powder with the following general properties.

Table 1
Analysis and Physical Properties of Ti-Pure® R-900

Property	R-900
TiO_2, wt%, min.	94
Alumina, wt%	4.3
Amorphous Silica, wt%	—
Specific Gravity	4.0
Bulking Value, L/kg (gal/lb)	0.25 (0.03)
Organic Treatment	No
Color CIE L*	99.8
Median Particle Size, µm	0.41
Oil Absorption	15.2
pH	8.1
Resistance at 30°C (86°F) (1,000 ohm)	12
Carbon Black Undertone	12.4

Note: All values are typical unless otherwise specified.

Suggestions for Use

Ti-Pure® R-900 is a general-purpose interior pigment combining good gloss, high hiding power, and excellent dispersion. Recommended use is in:

- interior architectural coatings
- interior industrial coatings
- powder coatings
- coil coatings
- container coatings
- electrodeposition applications

Safety Precautions

- Titanium dioxide is classified as a nuisance dust. Follow all local regulations and DuPont recommendations for exposure limits as described in the Material Safety Data Sheet (MSDS). If the recommended exposure limits of TiO_2 are to be exceeded, NIOSH-approved air-purifying respirators with particulate filters should be used.
- As a matter of good industrial hygiene, gloves and safety glasses with side shields or better eye protection should be worn when handling TiO_2. For more details, refer to the MSDS.

First Aid

- If large amounts of TiO_2 are inhaled, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
- In case of eye contact, immediately flush with water for at least 15 minutes. Call a physician. In case of skin contact, the compound is not likely to be hazardous, but cleaning the skin after use is advised.

Shipping Containers

Ti-Pure® R-900 is available in 50-lb (25-kg) paper bags and semibulk containers (1/2 and 1 metric ton). Truckload shipments of the dry product are available directly from DuPont. Less-than-truckload volumes are available through one of the authorized DuPont distributors.

Product Storage

The shelf life of DuPont™ Ti-Pure® TiO_2 is indefinite as long as the material is kept from direct contact with moisture.

For further information about this grade or to request a sample, please see the DuPont Titanium Technologies web site.

www.titanium.dupont.com

H-65962-6 (02/07) Printed in the U.S.A.

DUPONT®

The miracles of science™

TEST REPORT

SABS

EPlast
Attention: Mr. Yusuf Karim
P.O. Box 82077
Southdale
2135

Your ref	:	Mark No: 5920
Our ref	:	ER302
Enquiries	:	MR K. Makhudu
☎	:	012 428 6057
N°	:	2116/ER302R
Page	:	1 of 3
Date	:	05-07-2011

TESTING TO SABS IEC 61084-1:1991
CABLE TRUNKING AND DUCTING SYSTEMS FOR ELECTRICAL INSTALLATIONS
Amended Report
This report supersedes the report number ER302 dated 21-06-2011

1 SUMMARY

A full specification test was performed. The samples tested comply with the requirements of SABS IEC 61084:1991 with respect to the test conducted. Refer to Clause 4 for the detail of the test performed.

2 DESCRIPTION OF SAMPLE

The following samples were submitted by: Mr. Yusuf Karim of EPlast.

SABS Sample No.	Quantity	Sample Description
ER302R	6 X 2M	No markings""

3 SAMPLE SUBMITTED

The samples were received in good condition and suitable for testing.

Date sample received	:	08-04-2011
Test commencement date	:	23-05-2011
Test completion date	:	05-07-2011

4 TEST REQUESTED

To test the samples submitted for compliance with the requirements of SABS IEC 61084-1:1991. Amendment was done due to the change in company (Cool Seal Industries cc); to the trade name (EPlast)

5 METHODS OF TESTING

Methods used according to SABS IEC 61084-1:1991

6 CONDITIONING AND TEST ENVIRONMENT

23 ± 2°C , 50 ± 5% relative humidity.

7 SUB CONTRACTING OF LABORATORIES

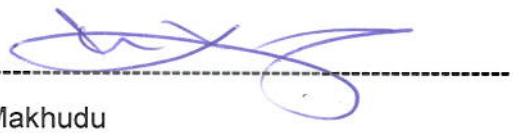
All tests were performed by: Rubber & Plastics Laboratory of SABS Commercial (Pty) Ltd, except for electrical characteristics which were performed by the Lighting Technology of SABS Commercial (Pty) Ltd.

8 RESULTS

PROPERTY	REQUIREMENTS	RESULTS
Dimensions internal usable surface area in cm^2:		
Small trunking	Nominal value not given	3.5
Big trunking	Nominal value not given	48.5
Linear deflection	1.0 maximum	0.6
Flame test	The sample does not ignite. The flame will extinguish within 30 seconds after the removal of flame	Complies
Impact test	Shall show no sign of disintegration nor shall there be any cracks visible to normal or corrected vision without magnification.	Complies
Electrical Characteristics	See report no: 2330/EI101 attached at the back	See report no: 2330/EI349
Markings	Each length of trunking and each trunking fitting shall be marked with the manufacturer's or responsible vendor's name, trade mark or other identifying symbol and the number of this specification. When trunking fittings are supplied in a package, a label attached to each package and marked as above will be sufficient marking.	N/A

9 **Disposition**

All test samples will be disposed off, if not collected within 3 months from date of this report



K. Makhudu

TEST OFFICER: RUBBER AND PLASTICS

CM Sibiya

MANAGER: RUBBER AND PLASTICS & PAINTS AND SEALANT

TEST REPORT

SABS

Your ref:	ER302
Our ref.:	EI349
Enquiries:	KD Dhimmar
Tel:	(012)428-6209
Report No.:	2330/EI349
Date:	10-06-2011
Page:	1 of 2

The Manger
Rubber &Plastics
Attention: Mr. K. Makhudu
Private Bag X191
PRETORIA
0001

TESTING OF PVC TRUNKING

1. TEST REQUESTED

The testing of a sample of PVC Trunking for compliance with the requirements of Clause 11.1 and 12.3 of SANS 61084 -1:1991.

2. DESCRIPTION OF SAMPLE

The sample consisted of a piece of grey coloured PVC Trunking approximately 520 mm in length and 40 x 25 mm in width. See page 2 for the photograph of the sample.

3. TEST METHOD

The tests were conducted in accordance with clause 11.1 and 12.3 of SANS 61084 -1:1991.

4. TEST RESULTS

4.1 Humidity Treatment 91% to 95% between 20°C and 30°C for 48 hours.
The sample complied.

4.2 Insulation resistance 500V (one minute).
The sample complied >100MΩ.

4.3 Electrical insulation strength 2500VAC @ 50Hz.(one minute).
The sample complied.

4.4 Glow -wire test 850°C.

The sample complied.

5. CONCLUSION

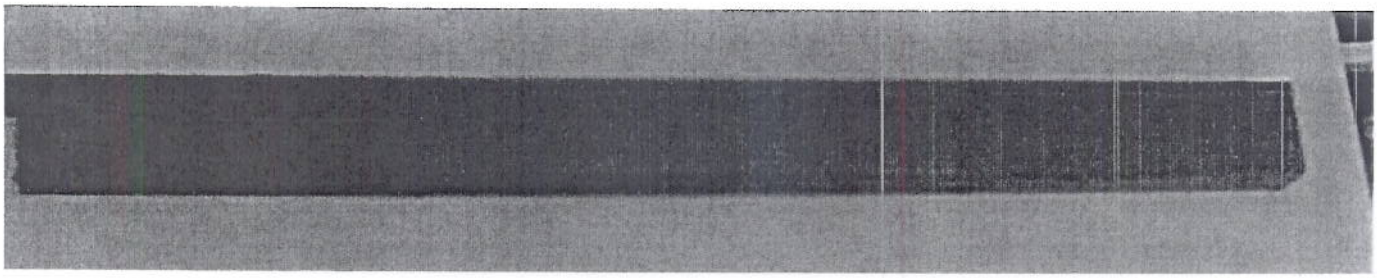
The sample complied with the requirements of clause 11.1 and 12.3 of SANS 61084 -1:1991.

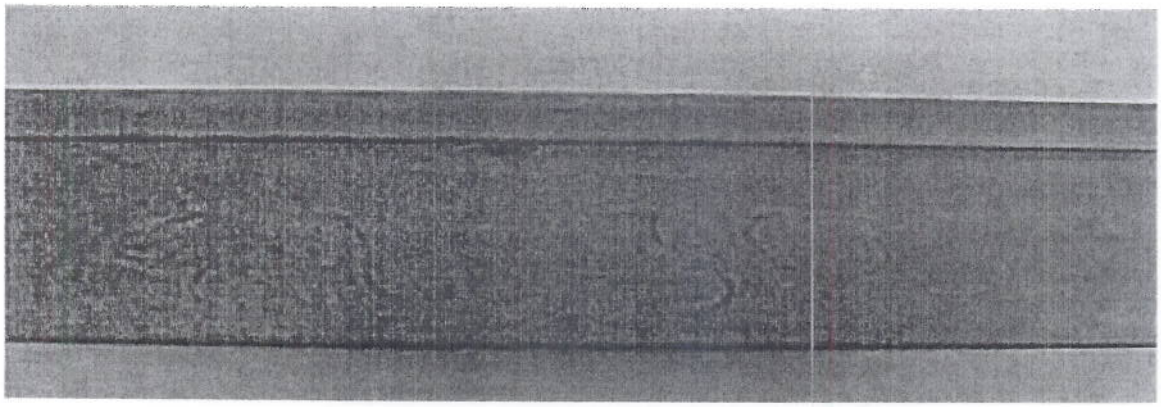
1 Dr Lategan Road, Groenkloof, Private Bag X191, Pretoria, 0001. Tel +27 12 428 7911, Fax +27 12 344 1568

Tested by: KD. Dhimmar
TEST OFFICER
LIGHTING TECHNOLOGY

T. Fourie
TECHNICAL SIGNATORY
LIGHTING TECHNOLOGY

PHOTOGRAPH OF THE SAMPLE





SABS

Customer Satisfaction Questionnaire: Rubber & Plastics/ Paints and Sealants Laboratory

It is the objective of Rubber and Plastics, Paints and Sealants laboratory to provide the best service possible. Please use this opportunity to give us feedback of the service delivery experience you had with us. This survey should take less than 5 minutes of your time to complete.

Name of BU : _____

Contact person : _____

Contact details:

Telephone : _____

Fax : _____

E-mail : _____

Please rate your satisfaction level with each of the following statements

5 = Very satisfied

4 = Somewhat satisfied

3 = Neutral

2 = Somewhat dissatisfied

1 = Dissatisfied

QUESTIONS	1	2	3	4	5
Are the **test reports** received tidy and unambiguous?	O	O	O	O	O
Are you satisfied with the **turnaround time** of the test laboratory?	O	O	O	O	O
Are you satisfied with the **availability and support** from the test officer?	O	O	O	O	O
Are you satisfied with the **professionalism** of our personnel (ethical behaviour, courteous, friendly, punctual, well presented and keep their promises)?	O	O	O	O	O
Are you satisfied with the **timeousness** of the personnel's responses?	O	O	O	O	O
Are you satisfied with the **technical knowledge and competence** of the test officers?	O	O	O	O	O
Are we providing services that meet the needs of your business?	O	O	O	O	O
Rate your overall satisfaction with our laboratory services	O	O	O	O	O

Comments & suggestions for service improvements:

This survey was designed to help us improve our service to our customers.

We thank you for making use of our services and appreciate the time you help us to better our service.

Please fax to (012) 428 6815 or e-mail to mokgablc@sabs.co.za.

SABS COMMERCIAL (Pty) Ltd – Reg. No. 2000/013581/07
Directors: Dr B Mehlomakulu, Ms TA Cooper, Dr T Demana, Ms B Mosako, Dr GR Visser
Website: www.sabs.co.za E-mail: info@ sabs.co.za

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Port Elizabeth, 6056
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Fax: +27 (0) 41 391 8427

Kwazulu-Natal:
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PO Box 30087,
Mayville, 4058
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Fax: +27 (0) 31 203 2907

Product data sheet

S6721

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South Africa
Tel: +27 (0) 11 458 0700
Fax: +27 (0) 11 458 0734

Sales office:
Chlor Vinyls Business
PO Box 2525
Randburg 2125
South Africa
Tel: +27 (0) 11 790 1111
Fax: +27 (0) 11 790 1067

Date of Issue: August 2012

www.sasol.com/polymers

Sasol Polymers Chlor Vinyls Business

Sasol Polymers PVC suspension resin: S6721

Sasol Polymers PVC S6721 is a free flowing white powder produced by a suspension polymerisation process that ensures high purity and consistent quality. Its consistent apparent density, excellent heat stability and ideal molecular mass provide the optimal blend of high output and consistent gelation in rigid PVC extrusion, while its good plasticizer absorption makes it suitable for flexible and semi-rigid PVC applications.

Material properties - S6721

Property	Unit	Value	Test method
K-value	-	66-68	ISO 1628-2
Apparent density	g/l	550-570	ISO 60
Volatile matter	%	<0.3	ISO 1269
Particle size >250µm	%	<2.5	ISO 4610
Cold plasticiser absorption	%	21.5-24.5	ISO 4608

The data in the table above has been obtained from laboratory tests conducted on representative samples of Sasol Polymers PVC S6721 polymer. These values are for general guidance and more detailed information regarding specifications, formulations and the use of this product may be obtained from Sasol Polymers Chlor Vinyls Business Sales Office or Sasol Polymers Technology Services Centre. The contact details are listed above.

Applications - S6721

Conversion process	End product application	Intercode	
		S6721 Rigids & Flexibles	S6721 Film
Extrusion pipe	uPVC, mPVC and oPVC pressure pipe, solid and structured-wall sewer, soil and drain pipe, conduit	●	❍
Extrusion - rigids	Gutters, ducting, window & general profiles	●	❍
Extrusion - film	Shrink wrap, clear profiles	x	❍
Extrusion - flexible	Cable, hose, tubing, cap sealants	●	❍
Calendering - sheet	Tarpaulins, stationery	x	❍
Calendering - sheet	Flooring sheets and tiles	●	x
Moulding - flexible	Footwear	●	❍

Recommended intercode ● Suitable intercode ❍ Not recommended x

Food applications

All Sasol Polymers suspension PVC grades contain less than 1 mg Vinyl Chloride Monomer per kilogram (1 ppm). This ensures compliance with food packaging regulations which stipulate that food packaging may not contain Vinyl Chloride Monomer in excess of 1 mg per kilogram.

First aid treatment - recommended action

Inhalation of noxious fumes

The patient should be removed as rapidly as possible into fresh air, kept warm and at rest. Artificial respiration should be applied if necessary. Expert medical attention should be obtained immediately.

Eye injuries

PVC should be flushed from the eye with clean water. Medical attention should be sought immediately.

Ingestion of PVC resin

Medical attention should be sought immediately. Vomiting should not be induced.

General

It is important when summoning medical attention that the doctor or hospital is fully advised of the nature of the products being handled and the circumstances surrounding the accident.

JOINT VENTURES
Electronic Services [Pty] Ltd
Your Partners for Development, Production & Automatic Testing

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South Africa
P.O.B 1502 highlands north 2037
Phone +27 11 887-7222
Email: info@jves.co.za

The Diamond PGS Trunking System

1. General

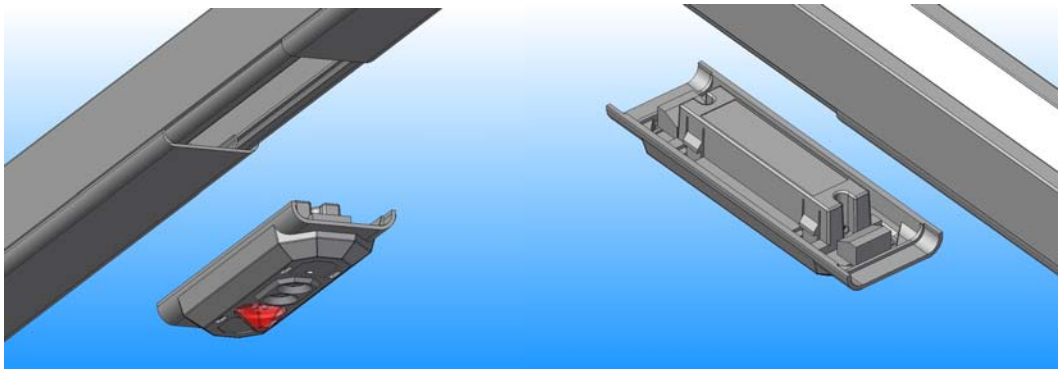
Parking Guidance Systems are installation intensive. Traditionally:

- Each sensor is enclosed in a plastic box.
- The sensors are mounted on the ceiling and/or under cable trays.
- Cable trays and/or conduits and/or trunking are used to wire them to the rest of the system
- In many applications the ceiling is too high. In such cases the system must be suspended.

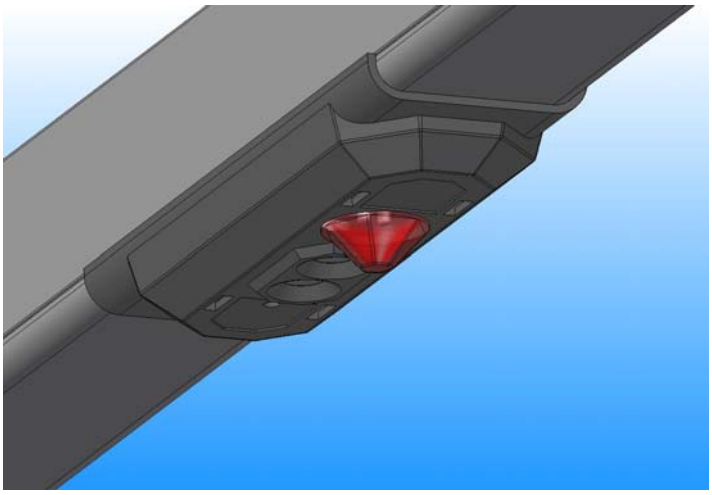
This type of system results with a messy array of conduits, clamps, cable trays and clusters of sensors hanging down and going around various obstacles.

We, at Joint Venture Electronic Systems, have developed The unique PGS Trunking system that provides a full solution to the installation of our Parking Guidance System:

- A neat and professional, aesthetically pleasing system.
- All sensors and indicators are embedded in the trunking system.
- Steel enforced main trunking channel provides for suspended system.
- The system comes with host of accessories catering for neat branching, curving and intersections.
- Low cost!
- Most of the installation can be prepared at factory level, further reducing the cost.
- Easy to maintain – Units are effortlessly extracted out and clipped in



Sensor ready to be clipped, top and bottom view



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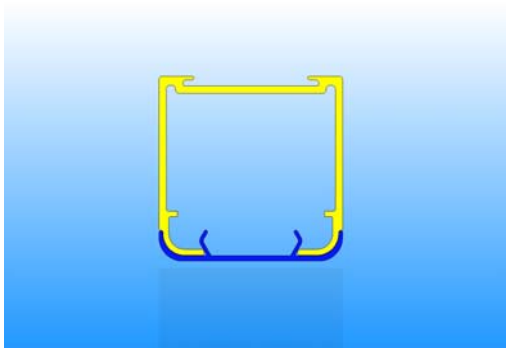
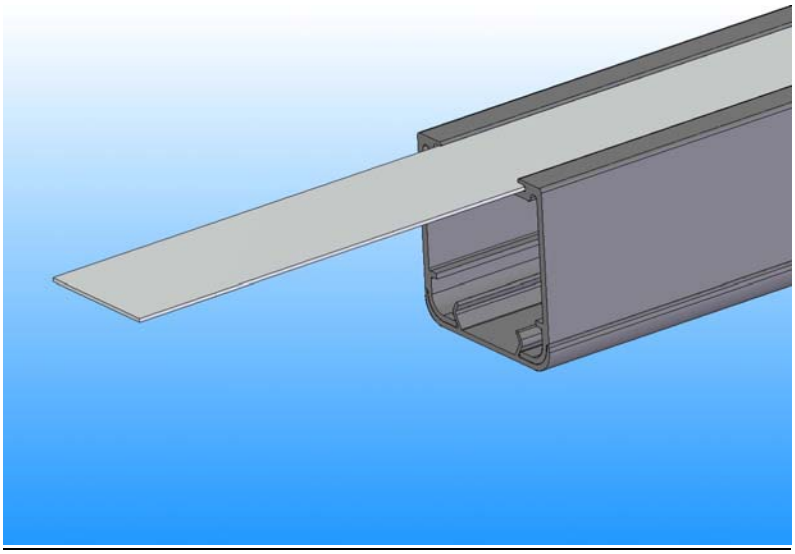
2. PGS Trunking components

2.1 The Trunking profile

The Trunking is industrial grade 50mm X 50mm with 2mm wall thickness PVC trunking. One unique feature of the PGS trunking is the steel enforcement slot. The steel ribbon is inserted into the slot and guarantees no vertical sagging. JVES offers the trunking in various colours.



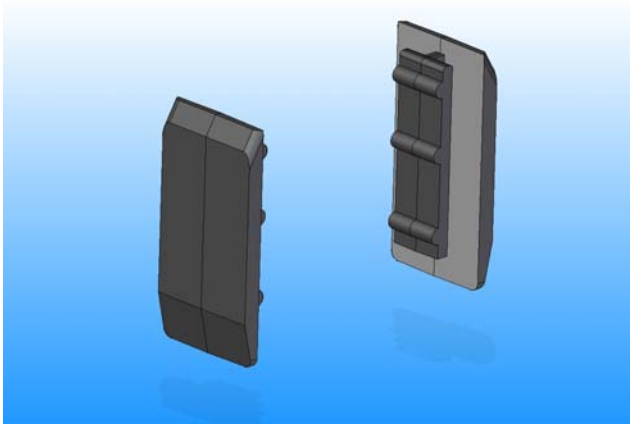
Trunking profile



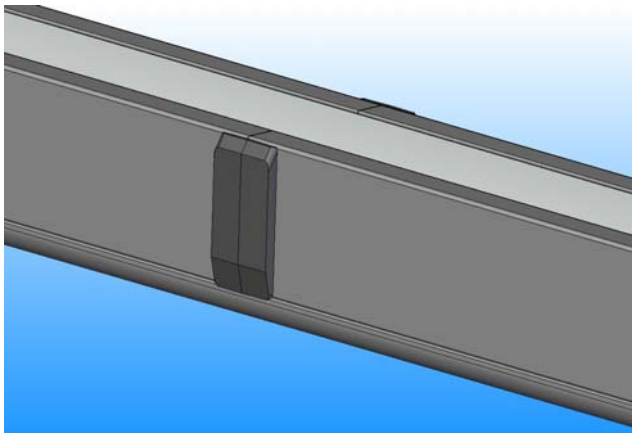
The steel enforcement prevents any horizontal sagging

2.2 Joiners

Joiners are used to gracefully hide stitches between two sections and to prevent water entry at the same time.



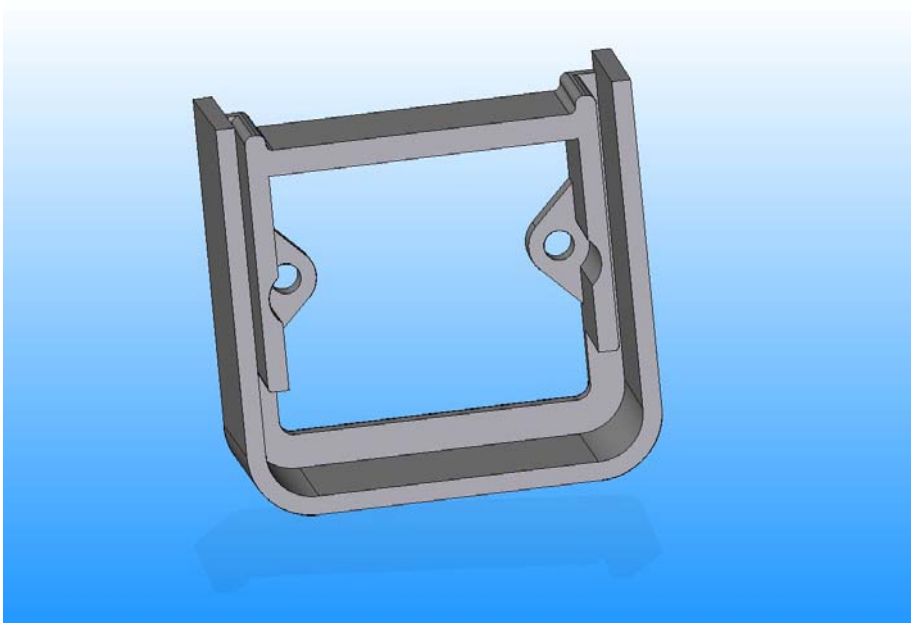
Joiner



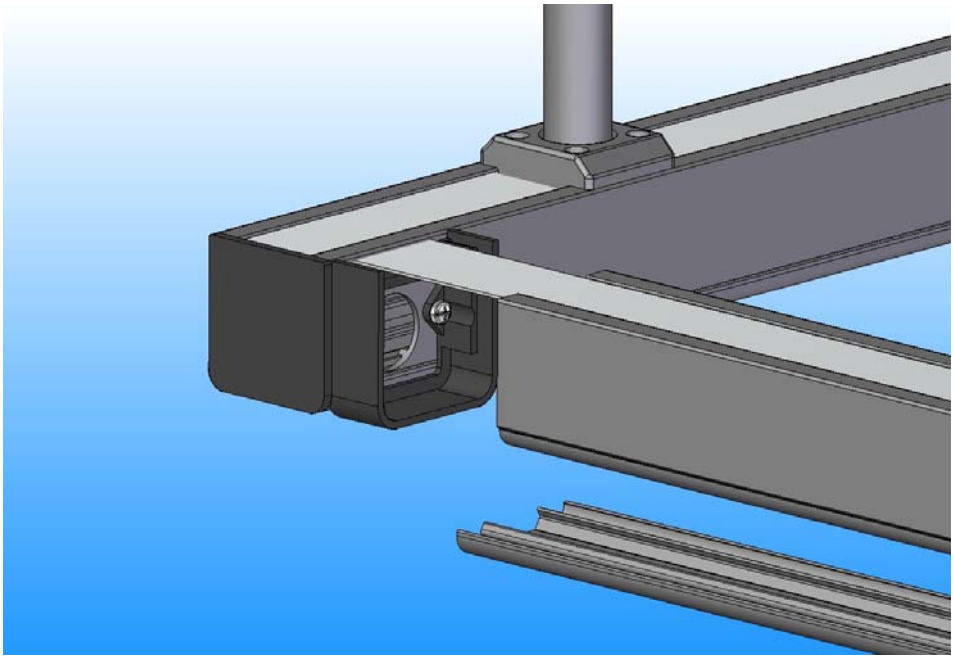
Bottom view of Joiner in use

2.3 Branching and turning

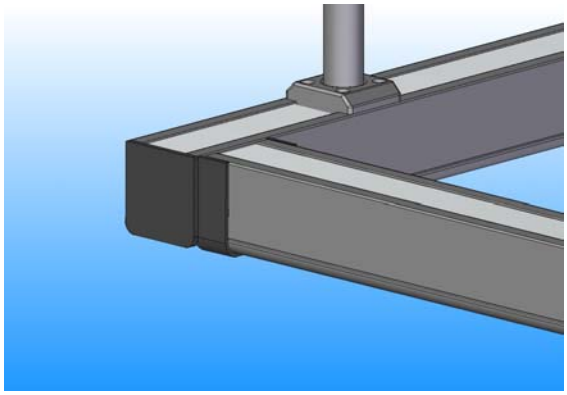
JVES has developed an easy way of branching and curving. L elbows T branching and four way intersections can be easily constructed using the Side Connector:

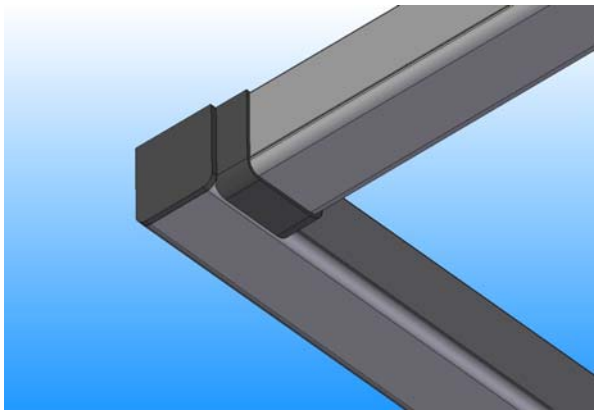


Side Connector

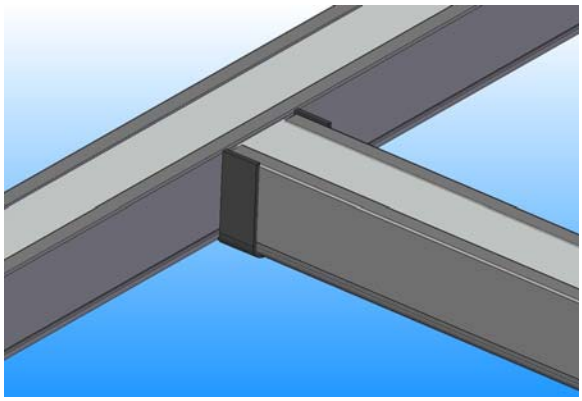


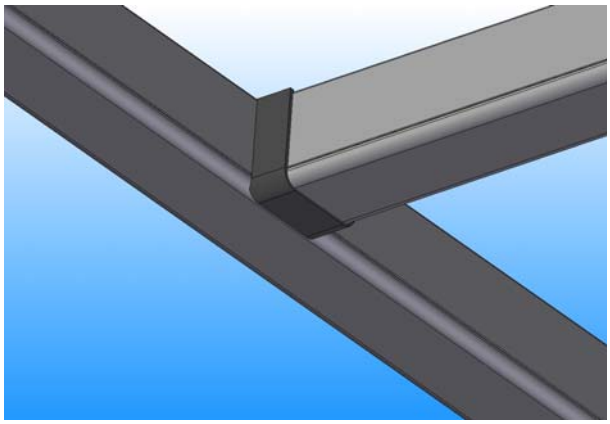
Side connector application for L turning



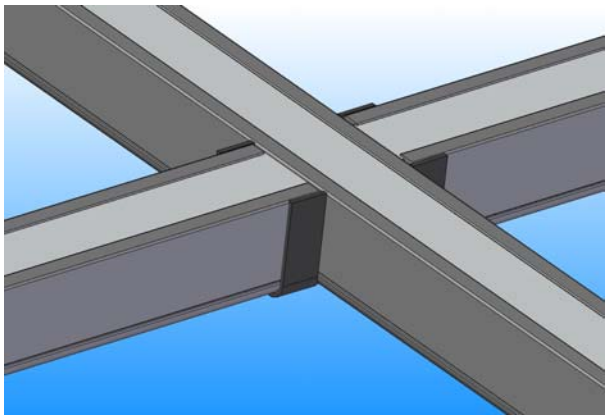


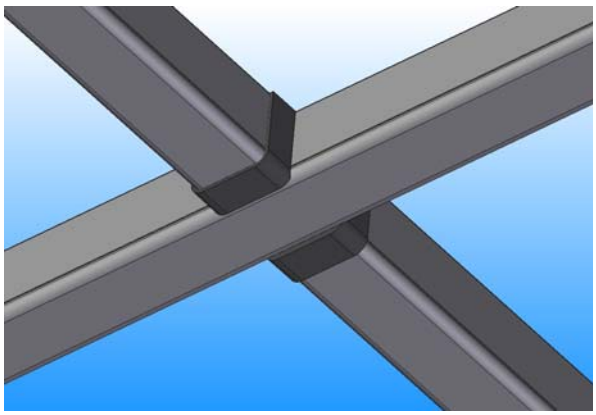
Side connector application for L turning





Side connector application for T turning





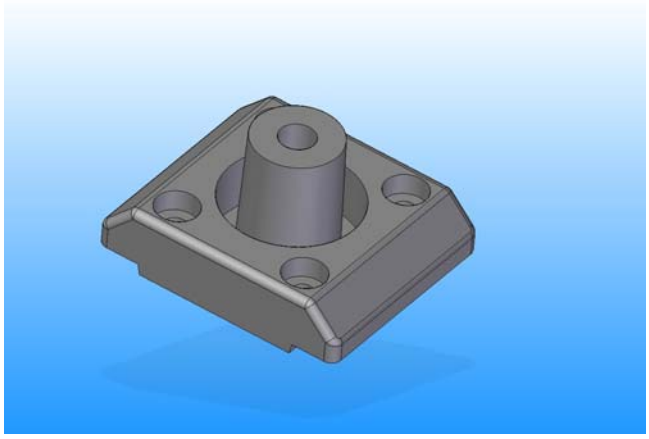
Side connector application for full intersection

2.4 Conduit entry

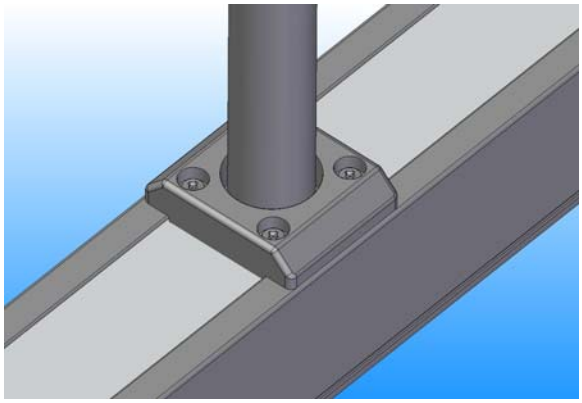
In order to provide a neat top entry to the system we developed the Conduit entry adaptor.

The conduit entry adaptor can be used as follows:

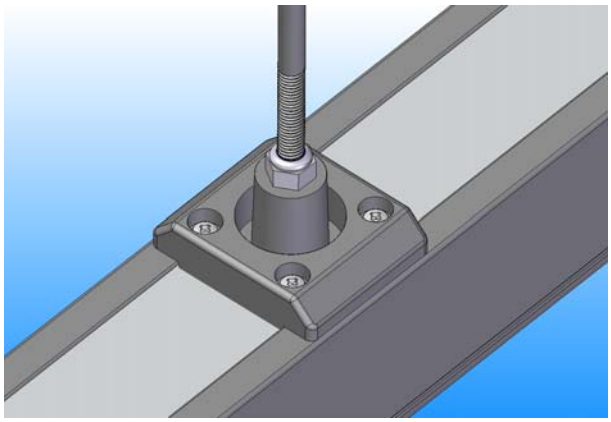
1. 20mm conduit entry point.
2. 25mm conduit entry point.
3. Suspension adaptor.



Conduit adaptor



Conduit entry using the adaptor

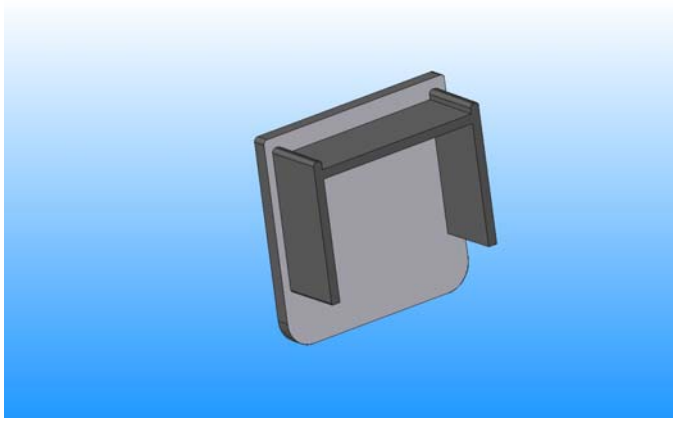


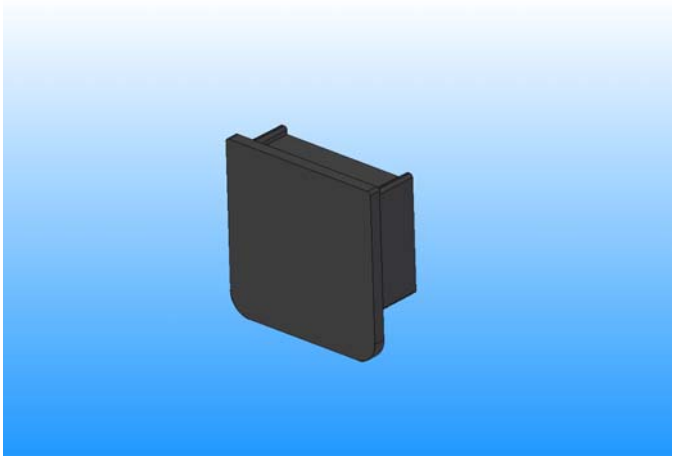
Rod entry using the adaptor

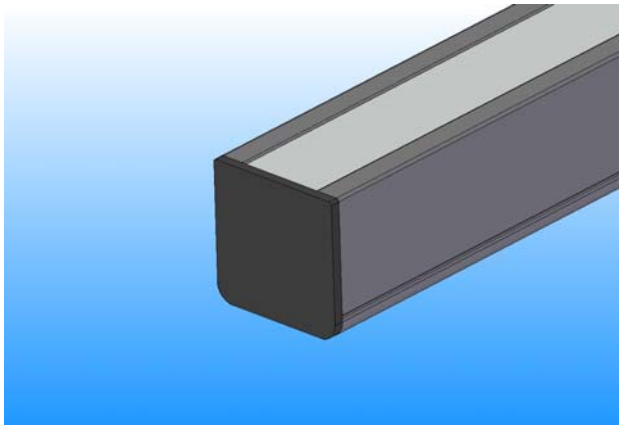
2.5 Other accessories

2.5.1 End cap

Used to seal the system at open ends and to attach ends to walls



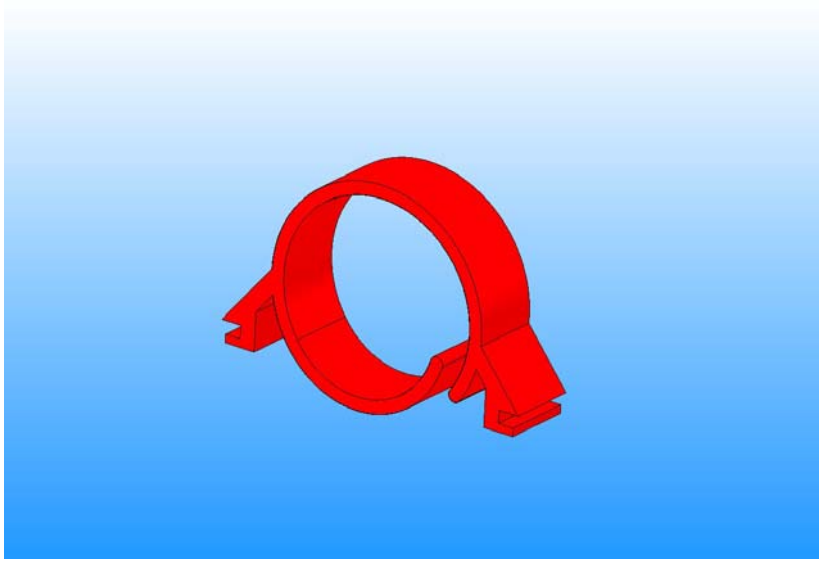




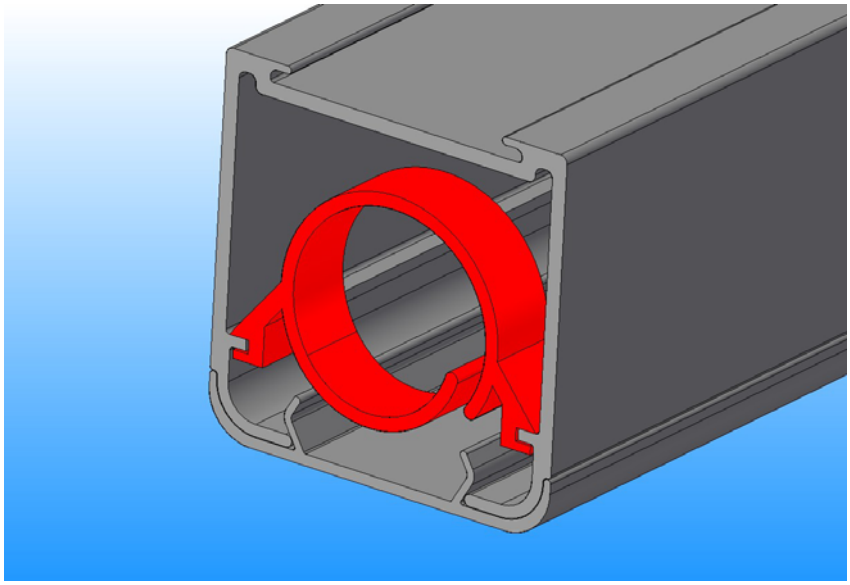
End cap application.

2.5.2 Wiring holder

During wiring and before the system is closed, the Wire Clip is used to keep the wire inside the trunking.



Wire holder



Wire holder application

The Leader in Safety Testing

Company :	Joint Venture Electronic Services (Pty) Ltd
Sample :	Diamond Parking Guidance System
Specification:	IEC 60950-1:2005 + A1:2010 SANS 60950-1:2010
Report Number:	WCT 13/0646
Date of Issue:	2013-06-20

The sample complied with all the requirements of the above- mentioned specification.

Room S166, Building 33,
CSIR Grounds,
Brummeria,
Pretoria

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Menlopark
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South Africa

T0146

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vat reg #: 4620192684

Tel.: (+27 12) 349 1145
Fax.: (+27 12) 349 1249
E-mail: info@testafrica.co.za
Internet : http://www.testafrica.co.za

Test Report

IEC 60950-1:2005
Information technology equipment - Safety requirements

TEST REPORT #: **WCT 13/0646**

CLIENT:	*Joint Ventures Electronic Services (Pty) Ltd* *PO Box 1502* *Highlands North* *2037* *Attention: Mr Danny Marom* *Order #: Application Form* *Date of Order: 13 June 2013*
SAMPLE:	*Parking Guidance System*
TEST SPECIFICATION:	*IEC 60950-1:2005 + A1:2012/* *SANS 60950-1:2010*
SUMMARY OF RESULTS:	*Complied*
DATED STARTED:	*2013-06-13*
DATED COMPLETED:	*2013-06-20*
DATE OF ISSUE:	*2013-06-20*

TESTED: _____
GH Holtzhausen (Technical Signatory)

APPROVED: _____
LP Kuisis (Jnr) (Technical Signatory)

NOTE:
"The South African National Accreditation System (SANAS) is a member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). This Arrangement allows for the mutual recognition of technical test and calibration data by the member accreditation bodies worldwide. For more information on the Arrangement please consult www.ilac.org"

1. DESCRIPTION OF SAMPLE

MANUFACTURER:	***Joint Ventures Electronic Services (Pty) Ltd***
MODEL:	***Diamond Parking Guidance System***
SERIAL #:	**-**
COUNTRY OF ORIGIN:	***Republic of South Africa***
RATED INPUT:	***Class I Power Supply - 1,0 A/ 3 Digit Display - 0,5 A Max***
RATED VOLTAGE:	***180 - 240 V 50 - 60 Hz***

2. ABBREVIATIONS:

TEST DOES NOT APPLY:	**N/A**
SAMPLE MEET REQUIREMENTS(COMPLY):	**C**
SAMPLE DOES NOT MEET REQUIREMENTS(FAIL):	**F**
NOT TESTED:	**N/T**

3. SYMBOLS

Tests are not included in the SANAS Accreditation Schedule for our laboratory.

- **Results from sub-contracted tests and other accredited test laboratories.**

— Opinions and interpretations expressed herein are outside the scope of SANAS accreditation

4. GENERAL REMARKS

*** Only a brief description of the requirements, measurements, etc. is given to indicate the nature of these. Consult the specification for details.**
*** The sections and subsections refer to in this report, are numbered as the test specification.**
*** This document shall not be reproduced in full unless approved by T.E.S.T. *Africa*.**
*** For sample identification, please see Appendix 1.**

5. TEST CONDITIONS

Climatic conditions that prevailed during the tests:

	Maximum	Minimum	Limits
Ambient temperature	**25 /C**	**20 /C**	**25 /C ± 10 /C**
Relative humidity	**56 %**	**35 %**	**Below 75 % RH**

6. CONDITION OF SAMPLE(S)

New sample in working condition.

Particulars: test item vs. test requirements	
Equipment mobility .....:	**movable / hand-held / transportable /stationary / direct plug-in / <u>for building-in</u>**
Connection to mains .....:	**<u>pluggable equipment: type A</u>/ type B permanent connection/ detachable power supply cord/ non-detachable power supply cord/ not directly connected to mains**
Operating condition .....:	**<u>continuous</u> / short-time / intermittent**
Mains supply tolerance (%) .....:	**162 V to 254 Vac**
Tested for IT power systems .....:	**Yes / <u>No</u>**
IT testing, phase-phase voltage (V):	**-**
Overvoltage Category .....:	**OVC I/ <u>OVC II</u>/ OVC III/ OVC IV/ other :**
Pollution Degree .....:	**PD 1/ <u>PD 2</u>/ PD 3**
Class of equipment .....:	**<u>Class I</u> / Class II / Class III**
Mass of equipment (kg) .....:	**10,4 kg**
Protection against ingress of water .....:	**Ordinary**

General product information:

The system consisted of the following components:

- **3 Digit Display with Mean Well Power Supply**
- **Power Supply with Lenovo Power Supply**
- **Sensor Array consisting of**
    - **Parking Guidance System - Sensor T**
    - **PGS Indicator**
    - **Parking Guidance System - Sensor/ Indicator**
    - **Parking Guidance System - Zone Buzzer**

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
1	GENERAL		C
1.5	Components		C
1.5.1	General		C
	Comply with IEC 60950 or relevant component standard	(see appended table 1.5.1)	C
1.5.2	Evaluation and testing of components		C
1.5.3	Thermal controls		N/A
1.5.4	Transformers	PSU Certified	N/A
1.5.5	Interconnecting cables	Low Voltage	C
1.5.6	Capacitors in primary circuits .....:	PSU Certified	C
1.5.7	Double insulation or reinforced insulation bridged by components	PSU Certified	C
1.5.7.1	General		C
1.5.7.2	Bridging capacitors		C
1.5.7.3	Bridging resistors		N/A
1.5.7.4	Accessible parts		N/A
1.5.8	Components in equipment for IT power systems	Not for IT Power Systems	N/A
1.5.9	Surge suppressors		N/A
1.5.9.1	General		N/A
1.5.9.2	Protection of VDRs		N/A
1.5.9.3	Bridging of functional insulation by a VDR		N/A
1.5.9.4	Bridging of basic insulation by a VDR		N/A
1.5.9.5	Bridging of supplementary, double or reinforced insulation by a VDR		N/A
1.6	Power interface		C
1.6.1	AC power distribution systems		C
1.6.2	Input current	(see appended table 1.6.2)	C
1.6.3	Voltage limit of hand-held equipment		N/A
1.6.4	Neutral conductor		C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
1.7	Marking and instructions		C
1.7.1	Power rating and identification markings		C
	Rated voltage(s) or voltage range(s) (V) .....:	180 - 240 Vac	C
	Symbol for nature of supply, for d.c. only .....:	Output - Clearly Marked	C
	Rated frequency or rated frequency range (Hz) :	50 - 60	C
	Rated current (mA or A) .....:	1,0/ 0,5 A Max	C
	Manufacturer's name or trademark or identification mark .....:	Joint Ventures Electronic Services	C
	Type/model or type reference .....:	Diamond	C
	Symbol for Class II equipment only .....:	Class I	N/A
	Other symbols .....:		N/A
	Certification marks .....:		N/A
1.7.2	Safety instructions	Provided	C
1.7.2.1	General		C
1.7.2.2	Disconnect devices	Part of Equipment	N/A
1.7.2.3	Overcurrent protective device	PSU Certified	C
1.7.2.4	IT power distribution systems		N/A
1.7.2.5	Operator access with a tool		N/A
1.7.2.6	Ozone		N/A
1.7.3	Short duty cycles	Continuous Operation	N/A
1.7.4	Supply voltage adjustment .....:	Auto Ranging	N/A
	Methods and means of adjustment; reference to installation instructions .....:		N/A
1.7.5	Power outlets on the equipment .....:	PSU Certified	C
1.7.6	Fuse identification .....:	Clearly Marked	C
1.7.7	Wiring terminals	Clearly Marked	C
1.7.7.1	Protective earthing and bonding terminals .....:		C
1.7.7.2	Terminal for a.c. mains supply conductors	Mean Well PSU	C
1.7.7.3	Terminals for d.c. mains supply conductors		C
1.7.8	Controls and indicators		C
1.7.8.1	Identifications, location and marking .....:		C
1.7.8.2	Colours.....:		C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
1.7.8.3	Symbols according to IEC 60417 .....:		N/A
1.7.8.4	Markings using figures .....:	Polarity	C
1.7.9	Isolation of multiple power sources .....:	Single Power Source	N/A
1.7.10	Thermostats and other regulating devices	None	N/A
1.7.11	Durability	Label	C
1.7.12	Removable parts	Not on Removable Parts	C
1.7.13	Replaceable batteries		N/A
	Language .....:	No Batteries	—
1.7.14	Equipment for restricted access locations .....:	Not for RAL	N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
2	PROTECTION FROM HAZARDS		C
2.1	Protection from electric shock and energy hazards		C
2.1.1	Protection in operator access areas		C
2.1.1.1	Access to energized parts		C
	Test by inspection .....:		C
	Test with test finger (Figure 2A).....:		C
	Test with test pin (Figure 2B).....:		C
	Test with test probe (Figure 2C).....:		N/A
2.1.1.2	Battery compartments .....:	No TNV	N/A
2.1.1.3	Access to ELV wiring		N/A
	Working voltage (V); minimum distance (mm) through insulation	(see appended table 2.10.5)	—
2.1.1.4	Access to hazardous voltage circuit wiring	Not Operator Accessible	C
2.1.1.5	Energy hazards .....:	(see appended table 2.1.1.5 c1 & 2.1.1.5 c2)	N/A
2.1.1.6	Manual controls		C
2.1.1.7	Discharge of capacitors in equipment		C
	Time-constant (s); measured voltage (V) .....:	PSU Certified	—
2.1.1.8	Energy hazards – d.c. mains supply		N/A
	a) Capacitor connected to the d.c. mains supply:		N/A
	b) Internal battery connected to the d.c. mains supply .....:		N/A
2.1.1.9	Audio amplifiers .....:		N/A
2.1.2	Protection in service access areas	No Service Areas	N/A
2.1.3	Protection in restricted access locations	Not for RAL	N/A

2.2	SELV circuits		C
2.2.1	General requirements	(see appended table 2.2)	C
2.2.2	Voltages under normal conditions (V) .....:		C
2.2.3	Voltages under fault conditions (V) .....:		C
2.2.4	Connection of SELV circuits to other circuits .....:	All SELV Connection	C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
2.3	TNV circuits		N/A
2.3.1	Limits	No TNV	N/A
	Type of TNV circuits .....:		—
2.3.2	Separation from other circuits and from accessible parts		N/A
2.3.2.1	General requirements		N/A
2.3.2.2	Protection by basic insulation		N/A
2.3.2.3	Protection by earthing		N/A
2.3.2.4	Protection by other constructions .....:		N/A
2.3.3	Separation from hazardous voltages		N/A
	Insulation employed .....:		—
2.3.4	Connection of TNV circuits to other circuits		N/A
	Insulation employed .....:		—
2.3.5	Test for operating voltages generated externally		N/A
2.4	Limited current circuits		N/A
2.4.1	General requirements	No LCC	N/A
2.4.2	Limit values	(see appended table 2.4.2)	N/A
	Frequency (Hz) .....:		—
	Measured current (mA) .....:		—
	Measured voltage (V) .....:		—
	Measured capacitance (:F) .....:		—
2.4.3	Connection of limited current circuits to other circuits		N/A
2.5	Limited power sources		N/A
	Inherently limited output	No LPS	N/A
	Impedance limited output		N/A
	Overcurrent protective device limited output		N/A
	Regulating network limited output under normal operating and single fault condition		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
	Regulating network limited output under normal operating conditions and overcurrent protective device limited output under single fault condition	(see appended table 2.5)	N/A
	Output voltage (V), output current (A), apparent power (VA) .....:		—
	Current rating of overcurrent protective device (A)		—
2.6	Provisions for earthing and bonding		C
2.6.1	Protective earthing	PSU Certified	C
2.6.2	Functional earthing		N/A
2.6.3	Protective earthing and protective bonding conductors		C
2.6.3.1	General		C
2.6.3.2	Size of protective earthing conductors		C
	Rated current (A), cross-sectional area (mm²), AWG .....:	1,0 A; 0,75 mm²	—
2.6.3.3	Size of protective bonding conductors		N/A
	Rated current (A), cross-sectional area (mm²), AWG .....:		—
2.6.3.4	Resistance (**S**) of earthing conductors and their terminations, test current (A) .....:	(see appended table 2.6.3.4)	C
2.6.3.5	Colour of insulation .....:	Green/ Yellow	C
2.6.4	Terminals		C
2.6.4.1	General		C
2.6.4.2	Protective earthing and bonding terminals		C
	Rated current (A), type of nominal thread diameter (mm) .....:	1,0 A; 3,5 mm	—
2.6.4.3	Separation of the protective earthing conductor from protective bonding conductors		N/A
2.6.5	Integrity of protective earthing		C
2.6.5.1	Interconnection of equipment		C
2.6.5.2	Components in protective earthing conductors and protective bonding conductors		N/A
2.6.5.3	Disconnection of protective earth		C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
2.6.5.4	Parts that can be removed by an operator		N/A
2.6.5.5	Parts removed during servicing		N/A
2.6.5.6	Corrosion resistance		C
2.6.5.7	Screws for protective bonding		C
2.6.5.8	Reliance on telecommunication network or cable distribution system		N/A
2.7	Overcurrent and earth fault protection in primary circuits		C
2.7.1	Basic requirements	PSU Certified	C
	Instructions when protection relies on building installation		N/A
2.7.2	Faults not covered in 5.3		C
2.7.3	Short-circuit backup protection		C
2.7.4	Number of location of protective devices .....:		C
2.7.5	Protection by several devices		N/A
2.7.6	Warning to service personnel .....:		N/A
2.8	Safety interlocks		N/A
2.8.1	General principles	No Interlocks	N/A
2.8.2	Protection requirements		N/A
2.8.3	Inadvertent reactivation		N/A
2.8.4	Fail-safe operation		N/A
2.8.5	Moving parts		N/A
2.8.6	Overriding		N/A
2.8.7	Switches and relays and their related circuits		N/A
2.8.7.1	Separation distances for contact gaps and their related circuits(mm).....:		N/A
2.8.7.2	Overload test		N/A
2.8.7.3	Endurance test		N/A
2.8.7.4	Electric strength test	(see appended table 5.2	N/A
2.8.8	Mechanical actuators		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
2.9	Electrical insulation		C
2.9.1	Properties of insulating materials		C
2.9.2	Humidity conditioning		C
	Humidity (%) .....:	91 - 95	—
	Temperature (C) .....:	30	—
2.9.3	Grade of insulation	Basic	C
2.9.4	Separation from hazardous voltages		C
	Method(s) used .....:	Method 3)	C

2.10	Clearances, creepage distances and distances through insulation		C
2.10.1	General		C
2.10.1.1	Frequency .....:	50 - 60	C
2.10.1.2	Pollution degrees .....:	II	C
2.10.1.3	Reduced values for functional insulation		N/A
2.10.1.4	Intervening unconnected conductive parts		N/A
2.10.1.5	Insulation in circuits generating starting pulses		N/A
2.10.1.6	Special separation requirements		N/A
2.10.1.7	Insulation in circuits generating starting pulses		N/A
2.10.2	Determination of working voltage	(see appended table 2.10.2)	C
2.10.2.1	General		C
2.10.2.2	RMS working voltage	PSU Certified	C
2.10.2.3	Peak working voltage	PSU Certified	C
2.10.3	Clearances		C
2.10.3.1	General		C
2.10.3.2	Mains transient voltages	(see appended table 2.10.3 and 2.10.4)	C
	a) AC mains supply .....:	2 500	C
	b) Earthed d.c. mains supplies .....:		N/A
	c) Unearthed d.c. mains supplies .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
	d) Battery operation .....:		N/A
2.10.3.3	Clearances in primary circuit	(see appended table 2.10.3 and 2.10.4)	C
2.10.3.4	Clearances in secondary circuits	(see appended table 2.10.3 and 2.10.4)	C
2.10.3.5	Clearances in circuits having starting pulses		N/A
2.10.3.6	Transients from a.c. mains supply .....:		C
2.10.3.7	Transients form d.c. mains supply .....:		N/A
2.10.3.8	Transients from telecommunication networks and cable distribution systems .....:	No TNV	N/A
2.10.3.9	Measurement of transient voltage levels		N/A
	a) Transients from a mains supply		N/A
	For an a.c. mains supply .....:		N/A
	For a d.c. mains supply .....:		N/A
	b) Transients from a telecommunication network		N/A
2.10.4	Creepage distances	(see appended table 2.10.3 and 2.10.4)	C
2.10.4.1	General		C
2.10.4.2	Material group and comparative tracking index	IIIb	C
	CTI tests .....:		—
2.10.4.3	Minimum creepage distances	(see appended table 2.10.3 and 2.10.4)	C
2.10.5	Solid insulation		C
2.10.5.1	General		C
2.10.5.2	Distance through insulation		C
2.10.5.3	Insulation compound as solid insulation		C
2.10.5.4	Semiconductor devices		N/A
2.10.5.5	Cemented joints	(see appended table 2.10.3 and 2.10.4)	N/A
2.10.5.6	Thin sheet material - General		C
2.10.5.7	Separable thin sheet material	PSU Certified	C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
	Number of layers (pcs) .....:		—
2.10.5.8	Non-separable thin sheet material		N/A
2.10.5.9	Thin sheet material - standard test procedure		C
	Electric strength test	(see appended table 2.10.5)	—
2.10.5.10	Thin sheet material - alternative test procedure		N/A
	Electric strength	(see appended table 2.10.5)	—
2.10.5.11	Insulation in wound components		N/A
2.10.5.12	Wire in wound components		N/A
	Working voltage .....:		N/A
	a) Basic insulation not under stress .....:		N/A
	b) Basic, supplementary, reinforced insulation .:		N/A
	c) Compliance with Annex U .....:		N/A
	Two wires in contact inside wound component; angle between 45 and 90 .....:		N/A
2.10.5.13	Wire with solvent-based enamel in wound components		N/A
	Electric strength	(see appended table 2.10.5)	—
	Routine test		N/A
2.10.5.14	Additional insulation in wound components		N/A
	Working voltage .....:		N/A
	a) Basic insulation not under stress .....:		N/A
	b) Supplementary, reinforced insulation .....:		N/A
2.10.6	Construction printed boards		C
2.10.6.1	Uncoated printed boards	(see appended table 2.10.3 and 2.10.4)	C
2.10.6.2	Coated printed boards	(see appended table 2.10.3 and 2.10.4)	N/A
2.10.6.3	Insulation between conductors on the same inner surface of printed board	(see appended table 2.10.3 and 2.10.4)	N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
2.10.6.4	Insulation between conductors on different layers of a printed board		C
	Distance through insulation .....:	(see appended table 2.10.5)	—
	Number of insulations layers (pcs) .....:	Double Sided	C
2.10.7	Component external terminations	(see appended table 2.10.3 and 2.10.4)	N/A
2.10.8	Tests on coated printed boards and coated components		N/A
2.10.8.1	Sample preparation and preliminary inspection		N/A
2.10.8.2	Thermal conditioning		N/A
2.10.8.3	Electric strength	(see appended table 5.2)	—
2.10.8.4	Abrasion resistance test		N/A
2.10.9	Thermal cycling		N/A
2.10.10	Test for Pollution Degree 1 environment and insulation compound		N/A
2.10.11	Tests for semiconductor devices and cemented joints		N/A
2.10.12	Enclosed and sealed parts	PSU Certified	C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
3	WIRING, CONNECTIONS AND SUPPLY		C
3.1	General		C
3.1.1	Current rating and overcurrent protection	Adequate	C
3.1.2	Protection against mechanical damage		C
3.1.3	Securing of internal wiring	Well Secured	C
3.1.4	Insulation of conductors	(see appended table 5.2)	C
3.1.5	Beads and ceramic insulators		N/A
3.1.6	Screws for electrical contact pressure	Mean Well PSU	C
3.1.7	Insulating materials in electrical connections		C
3.1.8	Self-tapping and spaced thread screws		N/A
3.1.9	Termination of conductors		C
	10 N pull test		C
3.1.10	Sleeving on wiring		N/A
3.2	Connection to an a.c. mains supply or a d.c. mains supply		C
3.2.1	Means of connection .....:	Mains Plug	C
3.2.1.1	Connection to an a.c. mains supply		C
3.2.1.2	Connection to a d.c. mains supply		N/A
3.2.2	Multiple supply connections		C
3.2.3	Permanently connected equipment		N/A
	Number of conductors, diameter (mm) of cable and conduits .....:		—
3.2.4	Appliance inlets		N/A
3.2.5	Power supply cords		C
3.2.5.1	AC power supply cords		C
	Type .....:	H03VV-F	—
	Rated current (A), cross-sectional area (mm²), AWG .....:	1,0 A; 0,75 mm²	—
3.2.5.2	DC power supply cords		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
3.2.6	Cord anchorage and strain relief		C
	Mass of equipment (kg), pull (N) .....:		—
	Longitudinal displacement (mm) .....:		—
3.2.7	Protection against mechanical damage		C
3.2.8	Cord guards		N/A
	D (mm); test mass (g) .....:		—
	Radius of curvature of cord (mm) .....:		—
3.2.9	Supply wiring space		C
3.3	Wiring terminals for connection of external conductors		C
3.3.1	Wiring terminals	Mean Well PSU	C
3.3.2	Connection of non-detachable power supply cords		C
3.3.3	Screw terminals		C
3.3.4	Conductor sizes to be connected		C
	Rated current (A), cord/cable type, cross-sectional area (mm²) .....:	1,0 A; 0,75 mm²	—
3.3.5	Wiring terminal sizes		C
	Rated current (A), type and nominal thread diameter (mm) .....:	1,0 A; 3,9 mm	—
3.3.6	Wiring terminals design		C
3.3.7	Grouping of wiring terminals		C
3.3.8	Stranded wire		C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
3.4	Disconnection from the mains supply		C
3.4.1	General requirements		C
3.4.2	Disconnect devices		C
3.4.3	Permanently connected equipment		N/A
3.4.4	Parts which remain energized		N/A
3.4.5	Switches in flexible cords		N/A
3.4.6	Single-phase equipment and d.c. equipment		C
3.4.7	Three-phase equipment		N/A
3.4.8	Switches as disconnect devices		N/A
3.4.9	Plugs as disconnect devices		C
3.4.10	Interconnected equipment		C
3.4.11	Multiple power sources		C
3.5	Interconnection of equipment		C
3.5.1	General requirements		C
3.5.2	Types of interconnection circuits .....:	SELV	C
3.5.3	ELV circuits as interconnection circuits		N/A
3.5.4	Data ports for additional equipment		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
4	PHYSICAL REQUIREMENTS		C
4.1	Stability		C
	Angle of 10		N/A
	Test: force (N) .....:		N/A
4.2	Mechanical strength		C
4.2.1	General		C
4.2.2	Steady force test, 10 N		C
4.2.3	Steady force test, 30 N		N/A
4.2.4	Steady force test, 250 N		C
4.2.5	Impact test		C
	Fall test		C
	Swing test		C
4.2.6	Drop test	For Built-in	N/A
4.2.7	Stress relief test	70 ° C 7 hrs	C
4.2.8	Cathode ray tubes	No CRT	N/A
	Picture tube separately certified .....:	(see separate test report or attached certificate)	N/A
4.2.9	High pressure lamps		N/A
4.2.10	Wall or ceiling mounted equipment; force (N) ...:	50	C
4.3	Design and construction		C
4.3.1	Edges and corners	Well Rounded	C
4.3.2	Handles and manual controls; force (N) .....:		N/A
4.3.3	Adjustable controls		N/A
4.3.4	Securing of parts		C
4.3.5	Connection of plugs and sockets		C
4.3.6	Direct plug-in equipment		N/A
	Dimensions (mm) of mains plug for direct plug-in .....:		N/A
	Torque and pull test of mains plug for direct plug-in; torque (Nm) .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
4.3.7	Heating elements in earthed equipment	No Heating Elements	N/A
4.3.8	Batteries	(see appended table 4.3.8)	N/A
	Overcharging of a rechargeable battery	No Batteries	N/A
	Unintentional charging of a non-rechargeable battery		N/A
	Reverse charging of a rechargeable battery		N/A
	Excessive discharging rate for any battery		N/A
4.3.9	Oil and grease	No Oil or Grease	N/A
4.3.10	Dust, powders, liquids and gases	No Dust, Powders, Liquids or Gases Produced	N/A
4.3.11	Containers for liquids or gases		N/A
4.3.12	Flammable liquids .....:	None	N/A
	Quantity of liquid (l) .....:		N/A
	Flash point (C) .....:		N/A
4.3.13	Radiation; type of radiation .....:	No Hazardous Radiation Produced	N/A
4.3.13.1	General		N/A
4.3.13.2	Ionizing radiation		N/A
	Measured radiation (pA/kg) .....:		—
	Measured high-voltage (kV) .....:		—
	Measured focus voltage (kV) .....:		—
	CRT markings .....:		—
4.3.13.3	Effect of ultraviolet (UV) radiation on materials		N/A
	Part, property, retention after test, flammability classification .....:		N/A
4.3.13.4	Human exposure to ultraviolet (UV) radiation ...:		N/A
4.3.13.5	Lasers (including laser diodes) and LEDs		N/A
4.3.13.5.1	Laser (including laser diodes)	(see separate test report of IEC/EN 60825-1 / IEC/EN 60825-2)	N/A
	Laser class .....:		—
4.3.13.5.2	Light emitting diodes (LEDs)		—
4.3.13.6	Other types .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
4.4	Protection against hazardous moving parts		N/A
4.4.1	General	No Moving Parts	N/A
4.4.2	Protection in operator access areas		N/A
4.4.3	Protection in restricted access locations		N/A
4.4.4	Protection in service access areas		N/A
4.4.5.1	General		N/A
	Not considered to cause pain or injury a)…….:		N/A
	Is considered to cause pain, not injury b)……:		N/A
	Considered to cause injury c) ……:		N/A
4.4.5.2	Protection for users		N/A
	Use of symbol or warning ……:		N/A
4.4.5.3	Protection for service persons		N/A
	Use of symbol or warning ……:		N/A
4.5	Thermal requirements		C
4.5.1	General		C
4.5.2	Temperature test		C
	Normal load condition per Annex I .....:	Considered	—
4.5.3	Temperature limits for materials	(see appended table 4.5)	C
4.5.4	Touch temperature limits	(see appended table 4.5)	C
4.5.5	Resistance to abnormal heat		C
4.6	Openings in enclosures		C
4.6.1	Top and side openings	(see appended table 4.6.1 & 4.6.2)	C
	Dimensions (mm) .....:		—
4.6.2	Bottoms of fire enclosures	(see appended table 4.6.1 & 4.6.2)	C
	Construction of the bottom .....:		—
4.6.3	Doors or covers in fire enclosures		N/A
4.6.4	Openings in transportable equipment		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
4.6.4.1	Constructional design measures		N/A
	Dimensions (mm) .....:		—
4.6.4.2	Evaluation measures for larger openings		N/A
4.6.4.3	Use of metallized parts		N/A
4.6.5	Adhesives for constructional purposes		N/A
	Conditioning temperature (C)/time (weeks) .....:		—
4.7	Resistance to fire		C
4.7.1	Reducing the risk of ignition and spread of flame		C
	Method 1, selection and application of components wiring and materials	(see appended table 4.7)	C
	Method 2, application of all of simulated fault condition tests	(see appended table 5.3)	N/A
4.7.2	Conditions for a fire enclosure		C
4.7.2.1	Parts requiring a fire enclosure		C
4.7.2.2	Parts not requiring a fire enclosure		C
4.7.3	Materials		C
4.7.3.1	General	Thermoplastics/ Metal	C
4.7.3.2	Materials for fire enclosures		C
4.7.3.3	Materials for components and other parts outside fire enclosures		N/A
4.7.3.4	Materials for components and other parts inside fire enclosures		C
4.7.3.5	Materials for air filter assemblies		N/A
4.7.3.6	Materials used in high-voltage components		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
5	ELECTRICAL REQUIREMENTS AND SIMULATED ABNORMAL CONDITIONS		C
5.1	Touch current and protective conductor current		C
5.1.1	General		C
5.1.2	Equipment under test (EUT)		C
5.1.2.1	Single connection to an a.c. mains supply		C
5.1.2.2	Redundant multiple connections to an a.c. mains supply		N/A
5.1.2.3	Simultaneous multiple connections to an a.c. mains supply		C
5.1.3	Test circuit		C
5.1.4	Application of measuring instrument		C
5.1.5	Test procedure		C
5.1.6	Test measurements	(see appended table 5.1.6)	C
5.1.7	Equipment with touch current exceeding 3,5mA:		N/A
5.1.8	Touch currents to and from telecommunication networks and cable distribution systems and from telecommunication networks		N/A
5.1.8.1	Limitation of the touch current to a telecommunication network and a cable distribution system		N/A
	Test voltage (V) .....:		—
	Measured touch current (mA) .....:		—
	Max. allowed touch current (mA) .....:		—
5.1.8.2	Summation of touch currents from telecommunication networks .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
5.2	Electric strength		C
5.2.1	General	(see appended table 5.2)	C
5.2.2	Test procedure	(see appended table 5.2)	C
5.3	Abnormal operating and fault conditions		C
5.3.1	Protection against overload and abnormal operation	(see appended table 5.3)	C
5.3.2	Motors	(see appended Annex B)	N/A
5.3.3	Transformers	(see appended Annex C)	C
5.3.4	Functional insulation .....:		C
5.3.5	Electromechanical components		N/A
5.3.6	Audio amplifiers in information technology equipment		N/A
5.3.7	Simulation of faults		C
5.3.8	Unattended equipment		C
5.3.9	Compliance criteria for abnormal operating and fault conditions		C
5.3.9.1	During the test		C
5.3.9.2	After the test		C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
6	CONNECTION TO TELECOMMUNICATION NETWORKS		N/A
6.1	Protection of telecommunication network service persons, and users of other equipment connected to the network, from hazards in the equipment		N/A
6.1.1	Protection from hazardous voltages		N/A
6.1.2	Separation of the telecommunication network from earth		N/A
6.1.2.1	Requirements	(see appended table 5.2)	N/A
	Test voltage (V) .....:		—
	Current in the test circuit (mA) .....:		—
6.1.2.2	Exclusions .....:		N/A
6.2	Protection of equipment users from overvoltages on telecommunication networks		N/A
6.2.1	Separation requirements		N/A
6.2.2	Electric strength test procedure		N/A
6.2.2.1	Impulse test	(see appended table 5.2)	N/A
6.2.2.2	Steady-state test	(see appended table 5.2)	N/A
6.2.2.3	Compliance criteria		N/A
6.3	Protection of the telecommunication wiring system from overheating		N/A
	Max. Output current (A) .....:		—
	Current limiting method .....:		—
7	CONNECTION TO CABLE DISTRIBUTION SYSTEMS		N/A
7.1	General		N/A
7.2	Protection of cable distribution system service persons, and users of other equipment connected to the system, from hazardous voltages in the equipment		N/A
7.3	Protection of equipment users from overvoltages on the cable distribution system		N/A
7.4	Insulation between primary circuits and cable distribution systems		N/A
7.4.1	General		N/A
7.4.2	Voltage surge test	(see appended table 5.2)	N/A
7.4.3	Impulse test	(see appended table 5.2)	N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
A	ANNEX A, TESTS FOR RESISTANCE TO HEAT AND FIRE		C
A.1	Flammability test for fire enclosures of movable equipment having a total mass exceeding 18 kg, and of stationary equipment (see 4.7.3.2)		N/A
A.1.1	Samples .....:		—
	Wall thickness (mm) .....:		—
A.1.2	Conditioning of samples; temperature (C) .....:		N/A
A.1.3	Mounting of samples .....:		N/A
A.1.4	Test flame		N/A
A.1.5	Test procedure		N/A
A.1.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....:		—
	Sample 2 burning time (s) .....:		—
	Sample 3 burning time (s) .....:		—
A.2	Flammability test for fire enclosures of movable equipment having a total mass not exceeding 18 kg, and for material and components located inside fire enclosures (see 4.7.3.2 and 4.7.3.4)		C
A.2.1	Samples, material .....:	Thermoplastics/ All Metal	—
	Wall thickness (mm) .....:	Data Inspected	—
A.2.2	Conditioning of samples		N/A
A.2.3	Mounting of samples		N/A
A.2.4	Test flame		N/A
A.2.5	Test procedure		N/A
A.2.6	Compliance criteria		N/A
	Sample 1 burning time (s) .....:		—
	Sample 2 burning time (s) .....:		—
	Sample 3 burning time (s) .....:		—
A.2.7	Alternative test acc. to IEC 60695-2-2, cl. 4, 8		N/A
	Sample 1 burning time (s) .....:		—
	Sample 2 burning time (s) .....:		—
	Sample 3 burning time (s) .....:		—
A.3	Hot flaming oil test (see 4.6.2)		N/A
A.3.1	Mounting of samples		N/A
A.3.2	Test procedure		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
A.3.3	Compliance criterion		N/A
B	ANNEX B, MOTOR TESTS UNDER ABNORMAL CONDITIONS (see 4.7.2.2 and 5.3.2)		N/A
B.1	General requirements		N/A
	Position .....:		—
	Manufacturer .....:		—
	Type .....:		—
	Rated values .....:		—
B.2	Test conditions		N/A
B.3	Maximum temperatures	(see appended table 5.3)	N/A
B.4	Running overload test	(see appended table 5.3)	N/A
B.5	Locked-rotor overload test		N/A
	Test duration (days) .....:		—
	Electric strength test: test voltage (V) .....:		—
B.6	Running overload test for d.c. motors in secondary circuits		N/A
B.7	Locked-rotor overload test for d.c. motors in secondary circuits		N/A
B.7.1	Test procedure	(see appended table 5.3)	N/A
B.7.2	Alternative test procedure; test time (h) .....:		N/A
B.7.3	Electric strength test	(see appended table 5.2)	N/A
B.8	Test for motors with capacitors	(see appended table 5.3)	N/A
B.9	Test for three-phase motors	(see appended table 5.3)	N/A
B.10	Test for series motors		N/A
	Operating voltage (V) .....:		—
C	ANNEX C, TRANSFORMERS (see 1.5.4 and 5.3.3)		C
	Position .....:	PSU Certified	—
	Manufacturer .....:	-	—
	Type .....:	-	—
	Rated values .....:	-	—
	Method of protection .....:	-	—
C.1	Overload test	(see appended table 5.3)	C

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
C.2	Insulation	(see appended table 5.2)	C
	Protection from displacement of windings .....:		C
D	ANNEX D, MEASURING INSTRUMENTS FOR TOUCH-CURRENT TESTS		C
D.1	Measuring instruments		C
D.2	Alternative measuring instrument		N/A
E	ANNEX E, TEMPERATURE RISE OF A WINDING		N/A
F	ANNEX F, MEASUREMENT OF CLEARANCES AND CREEPAGE DISTANCES (see 2.10)		C
G	ANNEX G, ALTERNATIVE METHOD FOR DETERMINING MINIMUM CLEARANCES		N/A
G.1	Summary of the procedure for determining minimum clearances		N/A
G.2	Determination of mains transient voltage (V) ....:		N/A
G.2.1	AC mains supply		N/A
G.2.2	DC mains supply		N/A
G.3	Determination of telecommunication network transient voltage (V) .....:		N/A
G.4	Determination of required withstand voltage (V):		N/A
G.5	Measurement of transient levels (V) .....:		N/A
G.6	Determination of minimum clearances .....:		N/A
H	ANNEX H, IONIZING RADIATION (see 4.3.13)		N/A
J	ANNEX J, TABLE OF ELECTROCHEMICAL POTENTIALS (see 2.6.5.6)		C
	Metal used .....:	Fe/	—
K	ANNEX K, THERMAL CONTROLS (see 1.5.3 and 5.3.7)		N/A
K.1	Making and breaking capacity		N/A
K.2	Thermostat reliability; operating voltage (V) .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
K.3	Thermostat endurance test; operating voltage (V) .....:		N/A
K.4	Temperature limiter endurance; operating voltage (V) .....:		N/A
K.5	Thermal cut-out reliability		N/A
K.6	Stability of operation	(see appended table 5.3)	N/A
L	ANNEX L, NORMAL LOAD CONDITIONS FOR SOME TYPES OF ELECTRICAL BUSINESS EQUIPMENT (see 1.2.2.1 and 4.5.1)		C
L.1	Typewriters		N/A
L.2	Adding machines and cash registers		N/A
L.3	Erasers		N/A
L.4	Pencil sharpeners		N/A
L.5	Duplicators and copy machines		N/A
L.6	Motor-operated files		N/A
L.7	Other business equipment		C
M	ANNEX M, CRITERIA FOR TELEPHONE RINGING SIGNALS (see 2.3.1		N/A
M.1	Introduction		N/A
M.2	Method A		N/A
M.3	Method B		N/A
M.3.1	Ringing signal		N/A
M.3.1.1	Frequency (Hz)		—
M.3.1.2	Voltage (V) .....:		—
M.3.1.3	Cadence; time (s), voltage (V) .....:		—
M.3.1.4	Single fault current (mA) .....:		—
M.3.2	Tripping device and monitoring voltage .....:		N/A
M.3.2.1	Conditions for use of a tripping device or a monitoring voltage		N/A
M.3.2.2	Tripping device		N/A
M.3.2.3	Monitoring voltage (V) .....:		N/A

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
N	ANNEX N, IMPULSE TEST GENERATORS (see 2.10.3.4, 6.2.2.1, 7.3.2 and clause G.5)		N/A
N.1	ITU-T impulse test generators		N/A
N.2	IEC 60065 impulse test generator		N/A
P	ANNEX P, NORMATIVE REFERENCES		C
Q	ANNEX Q, VOLTAGE DEPENDANT RESISTORS (VDR's) (see 1.5.9.1)		N/A
	a) Preferred climatic categories .....:		N/A
	b) Maximum continuous voltage .....:		N/A
	c) Pulse current .....:		N/A
R	ANNEX R, EXAMPLES OF REQUIREMENTS FOR QUALITY CONTROL PROGRAMMES		N/A
R.1	Minimum separation distances for unpopulated coated printed boards (see 2.10.6)		N/A
R.2	Reduced clearances (see 2.10.3)		N/A
S	ANNEX S, PROCEDURE FOR IMPULSE TESTING (see 6.2.2.3)		N/A
S.1	Test equipment		N/A
S.2	Test procedure		N/A
S.3	Examples of waveforms during impulse testing		N/A
T	ANNEX T, GUIDANCE ON PROTECTION AGAINST INGRESS OF WATER (see 1.1.2)		N/A
		See separate test report	—
U	ANNEX U, INSULATED WINDING WIRES FOR USE WITHOUT INTERLEAVED INSULATION (see 2.10.5.4)		N/A
		See separate test report	—

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
V	ANNEX V, AC POWER DISTRIBUTION SYSTEMS (see 1.6.1)		Noted
V.1	Introduction		Noted
V.2	TN power distribution systems		Noted
W	ANNEX W, SUMMATION OF TOUCH CURRENTS		C
W.1	Touch current from electronic circuits		C
W.1.1	Floating circuits		N/A
W.1.2	Earthed circuits		C
W.2	Interconnection of several equipments		C
W.2.1	Isolation		C
W.2.2	Common return, isolated from earth		N/A
W.2.3	Common return, connected to protective earth		C
X	ANNEX X, MAXIMUM HEATING EFFECT IN TRANSFORMER TESTS (see clause C.1)		N/A
X.1	Determination of maximum input current		N/A
X.2	Overload test procedure		N/A
Y	ANNEX Y, ULTRAVIOLET LIGHT CONDITIONING TEST (see 4.3.13.3)		N/A
Y.1	Test apparatus .....:		N/A
Y.2	Mounting of test samples .....:		N/A
Y.3	Carbon-arc light-exposure apparatus .....:		N/A
Y.4	Xenon-arc light exposure apparatus .....:		N/A
Z	ANNEX Z, OVERVOLTAGE CATEGORIES (see 2.10.3.2 and Clause G.2)		C
AA	ANNEX AA, MANDREL TEST (see 2.10.5.8)		N/A
BB	ANNEX BB, CHANGES IN THE SECOND EDITION		—

IEC 60950-1 / SANS 60950-1			
Clause	**Requirement - Test**	**Result - Remark**	**Verdict**
CC	ANNEX CC, EVALUATION OF INTEGRATED CIRCUIT (IC) CURRENT LIMITERS		N/A
CC.1	General		N/A
CC.2	Test program 1……:		N/A
CC.3	Test program 2……:		N/A
DD	ANNEX DD, REQUIREMENTS FOR THE MOUNTING MEANS OF RACK-MOUNTED EQUIPMENT		N/A
DD.1	General		N/A
DD.2	Mechanical strength test, variable N……:		N/A
DD.3	Mechanical strength test, 250N, including end stops……:		N/A
DD.4	Compliance……:		N/A
EE	ANNEX EE, HOUSEHOLD AND HOME/OFFICE DOCUMENT/MEDIA SHREDDERS		N/A
EE.1	General		N/A
EE.2	Markings and instructions		N/A
	Use of markings or symbols……..:		N/A
	Information of user instructions, maintenance and/or servicing instructions……..…:		N/A
EE.3	Inadvertent reactivation test……..…:		N/A
EE.4	Disconnection of power to hazardous moving parts:		N/A
	Use of markings or symbols……..:		N/A
EE.5	Protection against hazardous moving parts		N/A
	Test with test finger (Figure 2A).....……..:		N/A
	Test with wedge probe (Figure EE1 and EE2)…:		N/A

1.5.1	TABLE: list of critical components				C
object / part No.	Manufacturer / trademark	type / model	technical data	standard	mark (s) of conformity [1])
Ballast	Helvar	L11D	230 V 50 Hz	-	ENEC
Mains Plug	Crabtree	1048	16 A 250 V ~	SANS 164-1	SABS
Mains Cord	Linetek	H05VV-F	3G0,75	-	D,S,FI,N
PSU 1	Mean Well	RS-25-3.3	100 - 240 V ac 0,7 A	-	TÜV; UL
PSU 2	Lenovo	42T4432	100 - 240 v ~ 1,5 A	-	TÜV; UL
[1]) an asterisk indicates a mark which assures the agreed level of surveillance					

1.6.2	TABLE: electrical data (in normal conditions)					C
fuse #	Irated (A)	U (V)	P (W)	I (mA)	Ifuse (mA)	conditions / status
Complete System						
-	-	162	21	148	148	Normal Operation
-	-	180	25	171	171	Normal Operation
-	-	240	37	256	256	Normal Operation
-	-	254	45	300	300	Normal Operation
3 Digit Display						
-	-	162	16	152	152	Normal Operation
1	1,0	180	19	187	187	Normal Operation
1	1,0	240	32	306	306	Normal Operation
-	-	254	36	341	341	Normal Operation
Power Supply						
-	-	162	4	67	67	Normal Operation
1	1,0	180	4	71	71	Normal Operation
1	1,0	240	4	87	87	Normal Operation
-	-	254	4	91	91	Normal Operation

2.1.1.5 c1)	TABLE: max. V, A, VA test				N/A
Voltage (rated) (V)	Current (rated) (A)	Voltage (max.) (V)	Current (max.) (A)	VA (max.) (VA)	
All Enclosed					

Supplementary information:

2.1.1.5 c2)	TABLE: stored energy		N/A
Capacitance C (:F)	Voltage U (V)	Energy E (J)	
All Enclosed			
Supplementary information:			

2.2	TABLE: evaluation of voltage limiting components in SELV circuits		C
Component (measured between)	max. voltage (V) (normal operation)		Voltage Limiting Components
	V Peak	V dc	
PSU Certified			
Fault test performed on voltage limiting components	Voltage measured (V) in SELV circuits (V peak or V d.c.)		
Supplementary information:			

2.4.2	TABLE: limited current circuit measurement					N/A
Location	Voltage (V)	Current (mA)	Freq. (kHz)	Limit (mA)	Comments	
Notes:						

2.5	TABLE: limited power sources				N/A
Component (measured between)	I sc		VA		
	Measured	Limit	Measured	Limit	

Supplementary information:				

2.6.3.4	TABLE: ground continue test	C
Location	Resistance measured (mΩ)	Comments
Terminals and Chassis	0,023	Pass

2.10.2	Table: working voltage measurement		C
Location	Peak voltage (V)	RMS voltage (V)	Comments
PSU Certified			
Supplementary information:			

2.10.3 and 2.10.4	TABLE: clearance and creepage distance measurements					C
clearance cl and creepage distance dcr at / of:	Up (V)	Ur.m.s (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Indicator Circuit	12		0,8	3,5	1,3	3,5
Sensor Circuit	12		0,8	4,7	1,3	5,2

2.10.5	TABLE: distance through insulation measurements			C
distance through insulation di at/of:	Up (V)	test voltage (V)	required di (mm)	di (mm)
PCB	12	500	-	-

4.3.8	TABLE: Batteries								N/A
The tests of 4.3.8 are applicable only when appropriate battery data is not available									N/A
Is it possible to install the battery in a reverse polarity position?									N/A
	Non-Rechargeable batteries			Rechargeable batteries					
	Discharging		Unintentional charging	Charging		Discharging		Reversed charging	
	Meas. current	Manuf Specs		Meas. current	Manuf Specs	Meas. current	Manuf Specs	Meas. current	Manuf Specs
Max. current during normal condition									
Max. current during fault condition									

Test results:		Verdict
- Chemical leaks		N/A
- Explosion of the battery		N/A
- Emission of flame or expulsion of molten metal		N/A
- Electric strength tests of equipment after completion of tests		N/A
Supplementary information:		
Battery category ..... :	-	
Manufacturer ..... :	-	
Type / model ..... :	-	
Voltage ..... :	-	
Capacity ..... :	-	
Tested and Certified by (incl. Ref. No.) ..... :	-	

Circuit protection diagram:

MARKINGS AND INSTRUCTIONS (1.7.12, 1.7.15)	
Location of replaceable battery	
	Language(s):
Close to the battery	
In the servicing instructions	
In the operating instructions	

4.5	TABLE: maximum temperatures						C
	test voltage (V):	254					-
	t amb1 (C):	25					-
	t amb2 (C):	25					-
maximum temperature T of part/att:		T (C)					allowed Tmax (C)
3 Digit Display							
PSU 1 - Terminals		13					85
- Transformer		27					85(120 - 35)
- Capacitor X		13					80(105 - 25)
PCB 1 - Capacitor 1		22					60
- Coil 1		19					85(120 - 35)
- Capacitor 2		21					60
- Terminals		16					85
Ballast		43					85
Power Supply							
PCB 2 - Coil 1		8					85(120 - 35)
- Capacitor 2		11					60
- IC		7					No Limit
- Capacitor 1		17					60
Sensor Array							
Zone Buffer - Capacitor		14					60
Sensor T - Coil		4					85(120 - 35)
Sensor/ Indicator - Capacitor		6					60

temperature T of winding	R1 (**S**)	R2 (**S**)	T (C)	allowed T max (C)	insulation class

4.5.5	TABLE: ball pressure test of thermoplastic parts		N/A
	allowed impression diameter (mm) ..... :	#2 mm	-

Part	test temperature (C)	impression diameter (mm)

4.6.1, 4.6.2	Table: enclosure openings	C
Location	Size (mm)	Comments
No Openings		
Notes:		

4.7	TABLE: resistance to fire			C
part	manufacturer of material	type of material	thickness (mm)	flammability class
3 Digit Display	-	Metal	2,1	pass
Power Supply	-	Thermoplastic	3,4	pass

5.1	TABLE: touch current measurement		C
Measured between:	Measured (mA)	Limit (mA)	Comments/conditions
Live Parts and Earth	0,39	3,5	Pass
supplementary information:			

5.2	TABLE: electric strength tests, impulse tests and voltage surge tests	C
test voltage applied between:	test voltage (V) a.c. / d.c.	breakdown Yes / No
Live parts and Earth	1 500	No
supplementary information:		

5.3	TABLE: fault conditions tests					C
	ambient temperature (C) ..... :		24			-
	model/type of power supply ..... :		-			-
	manufacturer of power supply ..... :		-			-
	rated markings of power supply ..... :		-			-
component No.	fault	test voltage (V)	test time	fuse No.	Fuse current (A)	result
3 Digit Display - Polarity	Reversed	12	30 min	-	-	No Hazard
Power Supply - Polarity	Reversed	20	30 min	-	-	No Hazard
supplementary information:						

END OF REPORT

Appendix 1

Report number :WCT 13/0646	Page 1 of 10
Trading name :DIAMOND PARKING GUIDANCE SYSTEM	
Model number :DIAMOND PARKING GUIDANCE SYSTEM	
Figure 1 :Front view	
Figure 2 : Indicator	
Figure 3 : Sensor	
Figure 4 : Sensor indicator	
Figure 5 : Zone buffer	
Figure 6 : Digit display - Front view	
Figure 7 : Digit display - Rating label	
Figure 8 : Digit display - Internal layout 1	
Figure 9 : Digit display -Internal layout 2	
Figure 10 : Digit display - Internal layout 3	
Figure 11 : Digit display - PSU marking	
Figure 12 : Digit display - Ballast	
Figure 13 :Power supply - Front view	
Figure 14 : Power supply - Rating label	
Figure 15 : Power supply - Internal layout 1	
Figure 16 : Power supply - Internal layout 2	
Figure 17 : Power supply - PSU marking	

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

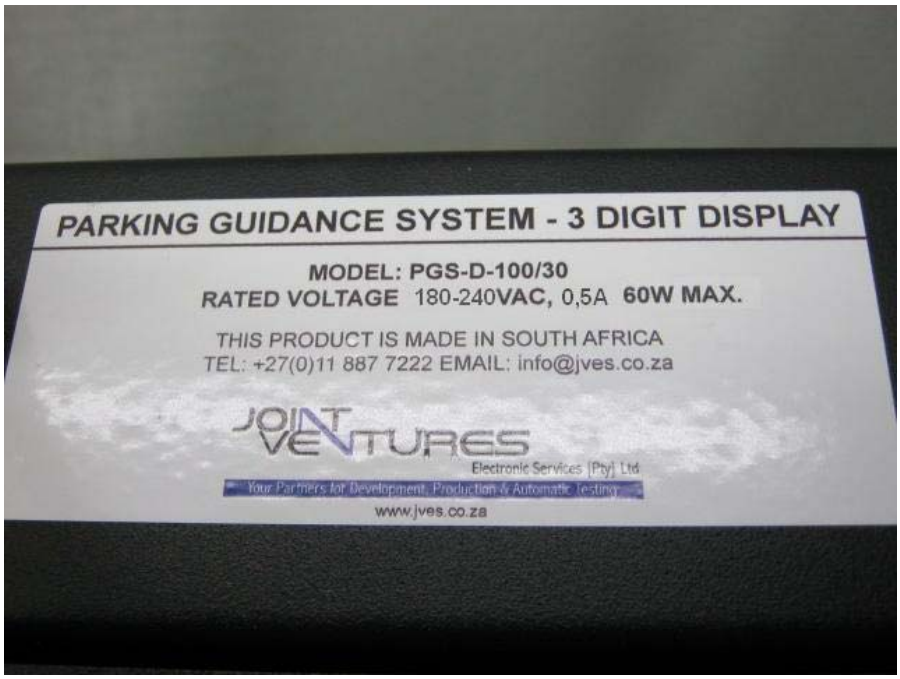

Figure 7

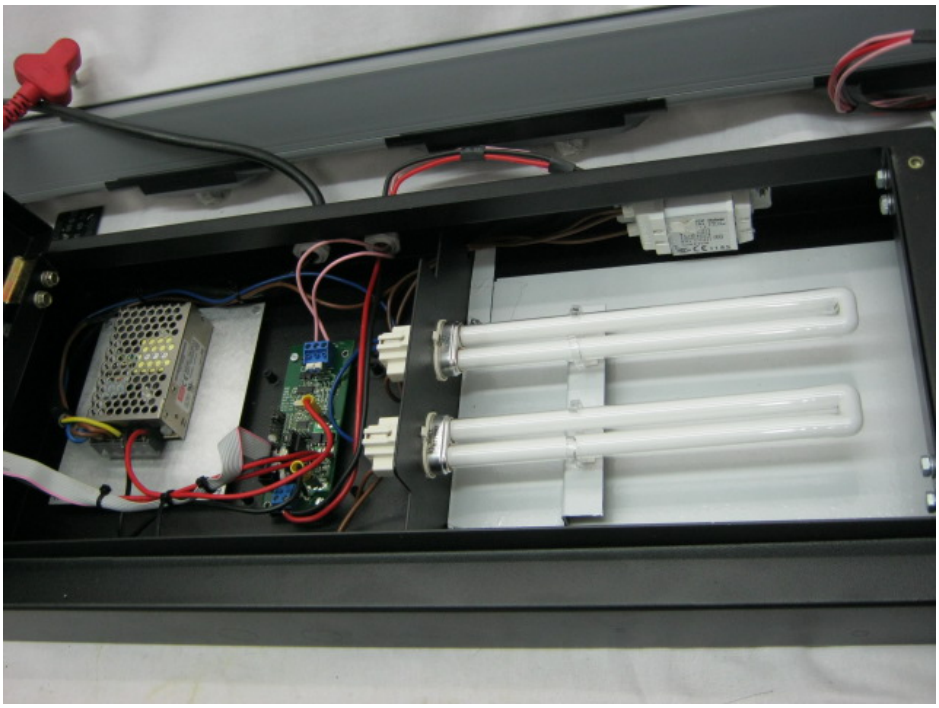

Figure 8

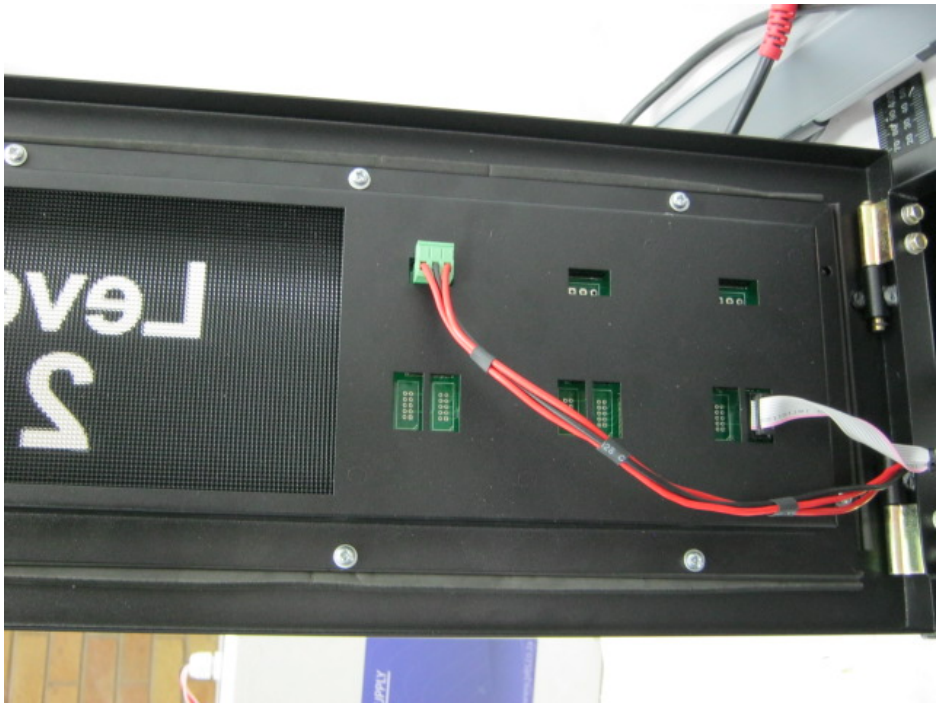

Figure 9

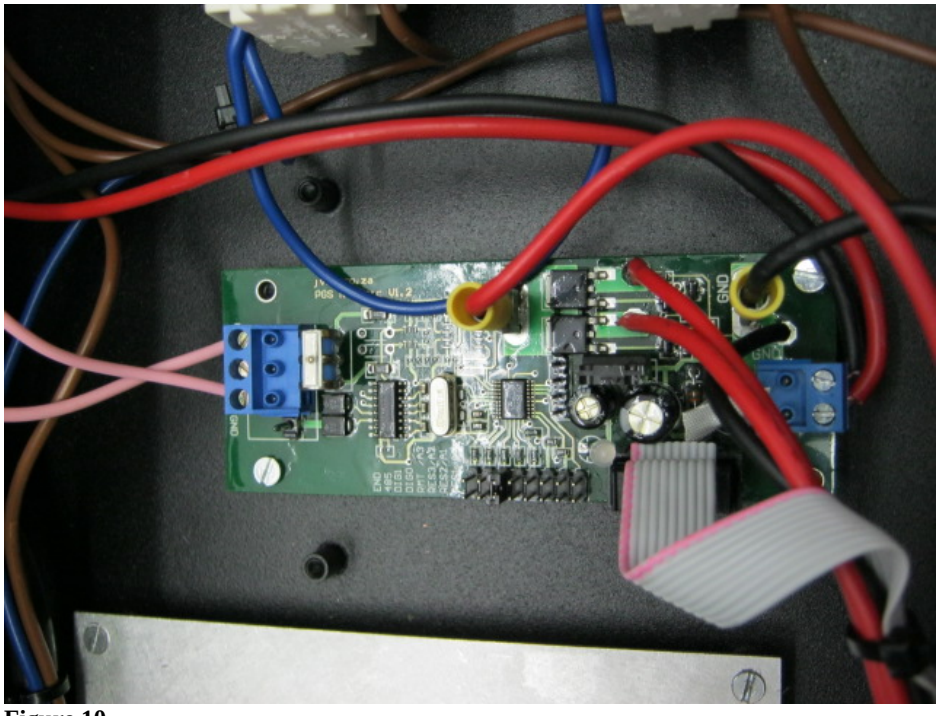

Figure 10

Figure 11

Figure 12

Figure 13

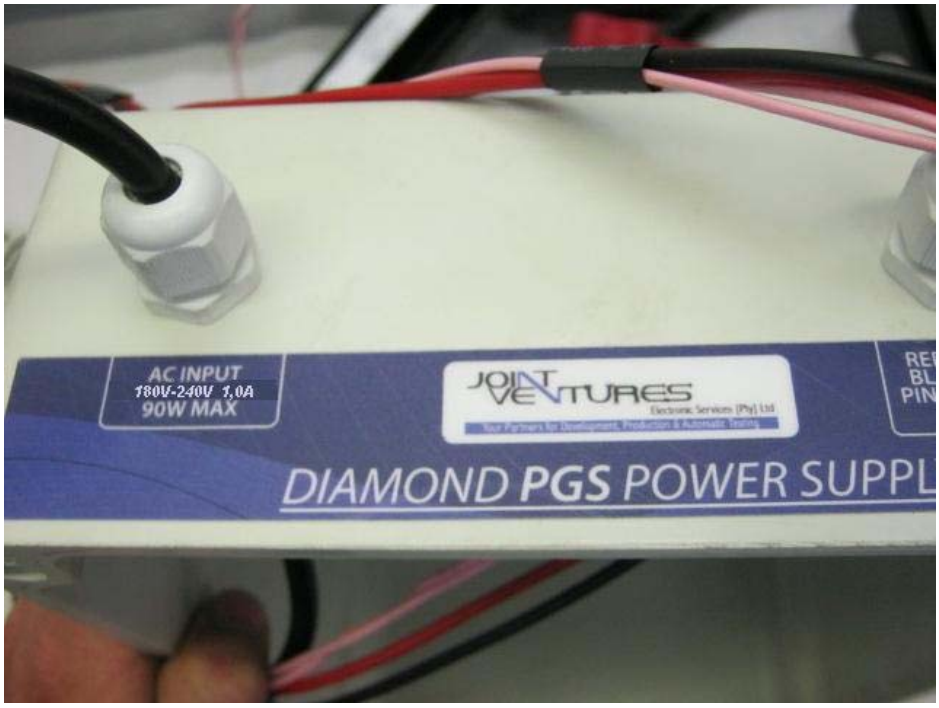

Figure 14

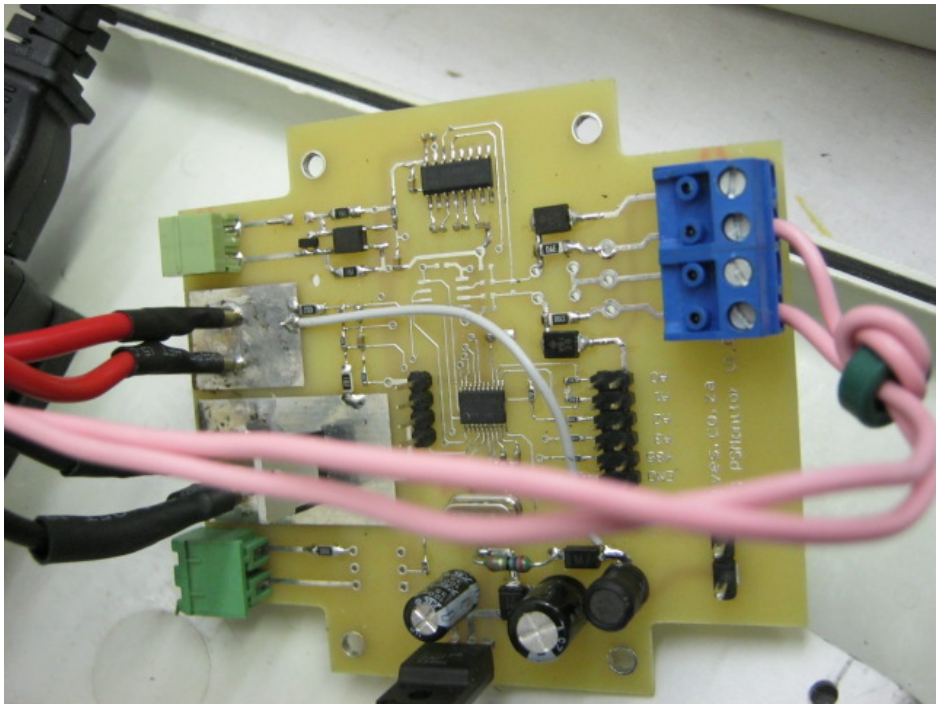

Figure 15

Figure 16


AC Adapter
90W 20V
(电源适配器/交换式電源供應器)
lenovo
®Registered Trademark of Lenovo
Manufactured for Lenovo
Product of China 制造地:中国/製造地:中國 DCWP MMC
MODEL (型号/型號) : 42T4432
FRU P/N: 42T4433
INPUT (输入/輸入) : 100~240V~1.5A(1.5A) 50-60Hz
OUTPUT (输出/輸出) : 20V ⎓ 4.5A(4.5A)
Signal
TÜV RT
R33030
Efficiency Level: V
レノボ・ジャパン 株式会社
N17908
V85
17
001
AR46
NYCE
NOM
Energy Verified
E131881
4T18
LISTED
ITE POWER SUPPLY
SAFETY MARK
REV:C

Figure 17

WCT (PTY) LTD T/A T.E.S.T. *Africa*
reg #: 2000/024600/07
vat reg #: 4620192684

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EC Declaration of Conformity

Directive 2006 / 95 / EC

Low Voltage Directive (LVD)

It can be certified that, after inspecting and tests conducted, the product describe is in conformity with the directive 2006 / 95 / EC **as amended.**

Parking Guidance System:

WCT 13/0646 - Diamond Parking Guidance System

The product has been assessed by application of the following standards or specifications:-

Information Technology Equipment - Safety of Machinery: **SABS IEC 60950-1:2005 + A1:2010**

Pretoria, 25 th March 2014

Gerhard H Holtzhausen
(Technical Signatory)