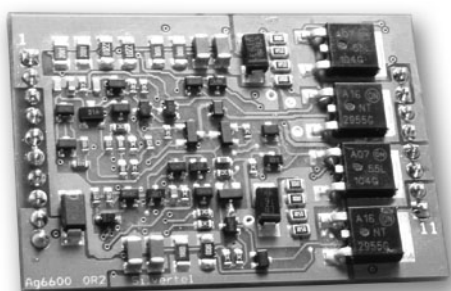




Ag6600

Power-over-HDBaseT (PoH) PSE Module



1. Features

- Compliant with PoH and IEEE802.3at Type 1(af) & Type 2
- Small SIL package size – 50.8mm (L) x 35mm (H)
- Low cost
- Output power up to 95W
- Minimal (low cost) external components required
- Over-current and short circuit protection
- Silvertel “design-in” assistance

2. Description

The Ag6600 is a Power-over-HDBaseT Power Sourcing Equipment (PSE) module designed to be compliant with PoH, IEEE802.3at Type 1(af) and Type 2 Power over Ethernet (PoE) applications.

The Ag6600 is capable of delivering up to 95W and is aimed at applications requiring PSE functionality such as single wire TV, CCTV DVR, home networking and industrial ethernet.

Ag6600 is a self-contained module, requiring just a few external components to provide a great deal of control and feedback over the Powered Device (PD) that is connected to the PSE.

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3. Ag6600 Product Selector

Part Number†	Output Power (W)
Ag6600	95

† The Ag6600 fully meets the requirements of the RoHS directive 2002/95/EC on the restriction of hazardous substances in electronic equipment.

Table 1: Ordering Information

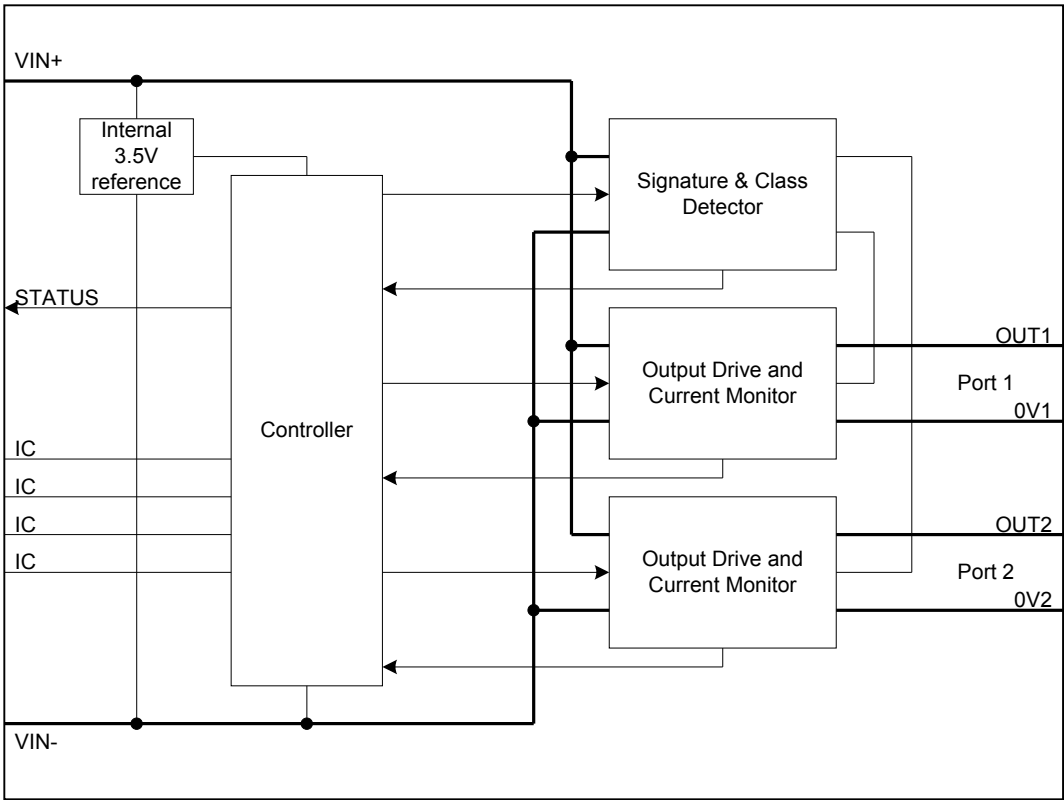


Figure 1: Block Diagram

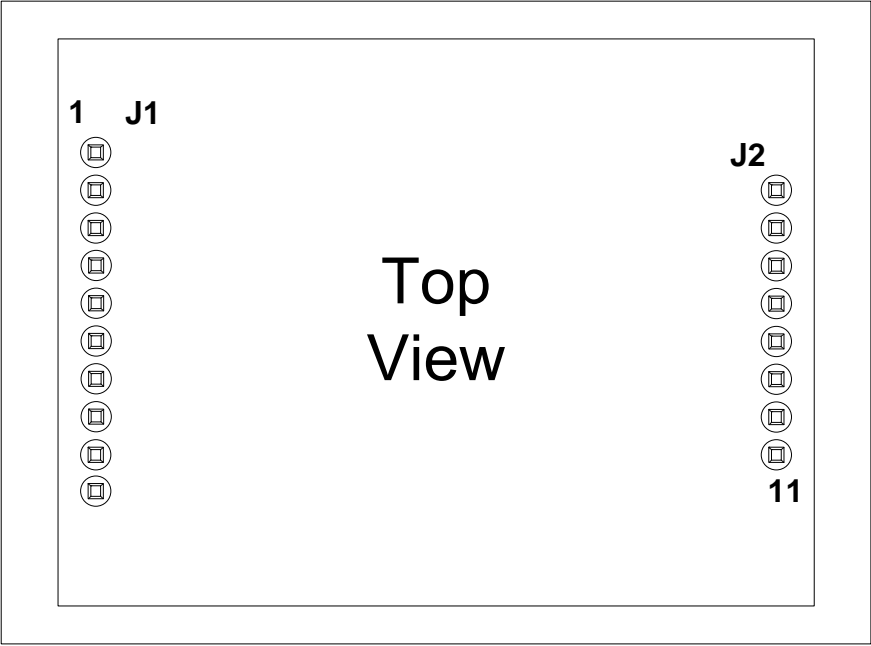


Figure 2: Ag6600 Package Format

4. Pin Description

Input Connector pins J1

Pin #	Name	Description
1	VIN+	Direct Input +. These pins connect to the external supply, positive terminal.
2		
3	IC	Internal Connection. Do not connect to this pin
4	IC	Internal Connection. Do not connect to this pin
5	STATUS	Output. This output pin is used to indicate the Ag6600 status.
6	IC	Internal Connection. Do not connect to this pin
7	IC	Internal Connection. Do not connect to this pin
8	IC	Internal Connection. Do not connect to this pin
9	VIN-	Direct Input -. These pins connect to the external supply, negative terminal.
10		

Output Connector pins J2

Pin #	Name	Description
11	OUT2	Port 2 Output. This output detects the signature and classification, then monitors the line and supplies power to valid device.
12		
13	0V2	Port 2 Return. The ground return for the OUT2.
14		
15	0V1	Port 1 Return. The ground return for the OUT1.
16		
17	OUT1	Port 1 Output. This output detects the signature and classification, then monitors the line and supplies power to valid device.
18		

5. Functional Description

5.1 Power Supplies

The Ag6600 only requires one power supply. To conform to the IEEE802.3at specification, this supply must be isolated from mains ground.

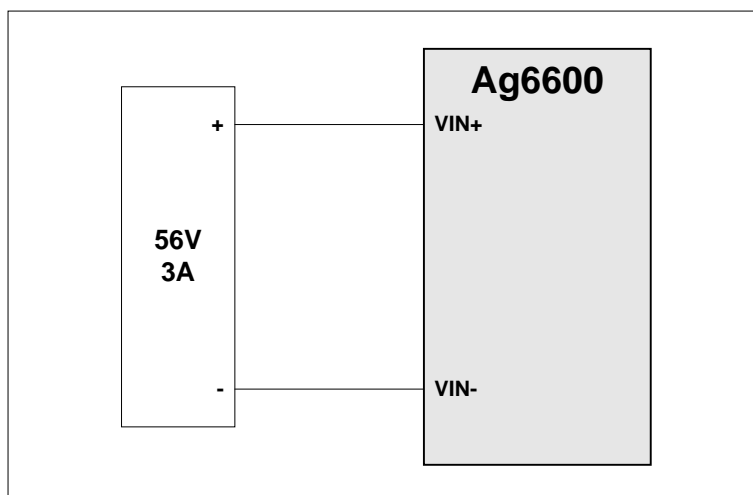


Figure 3: Power Supply Connections

5.2 Port Outputs

The Ag6600 Port outputs are connected directly to the centre-tap of a PoH compliant data transformer for 1/10GBASE-T applications, as shown in Figure 4.

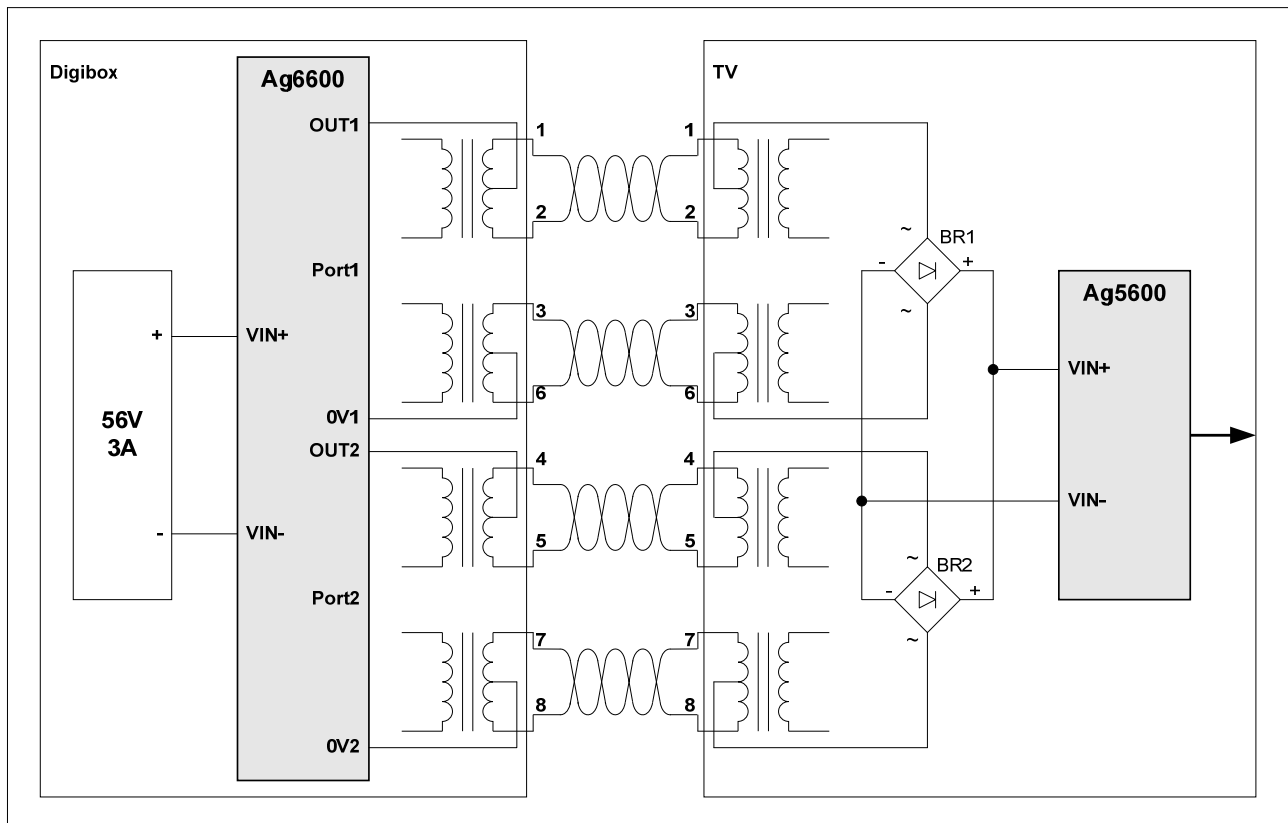


Figure 4: PoH Connection Diagram

6. Signature and Classification

To ensure that the Ag6600 does not apply power to a non PoE enabled device, the Port outputs first checks for a valid PoE signature. If the Ag6600 does not see a valid signature on either Port, then it will remain disconnect and will wait approximately 2 seconds before trying again. The signature parameters are shown in Figure 5.

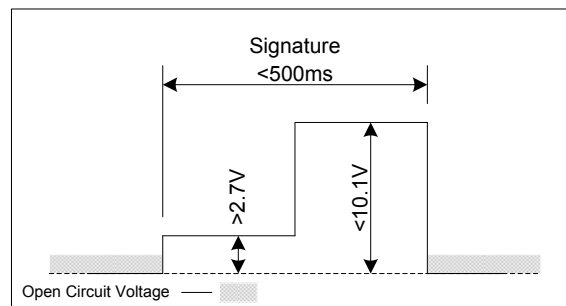


Figure 5: Signature

Upon the successful completion of a signature check, the Ag6600 will then check the Class setting of the Powered Device (PD). The Port output will give one of the two waveforms (shown in Figure 6), dependant on the Class setting of the PD.

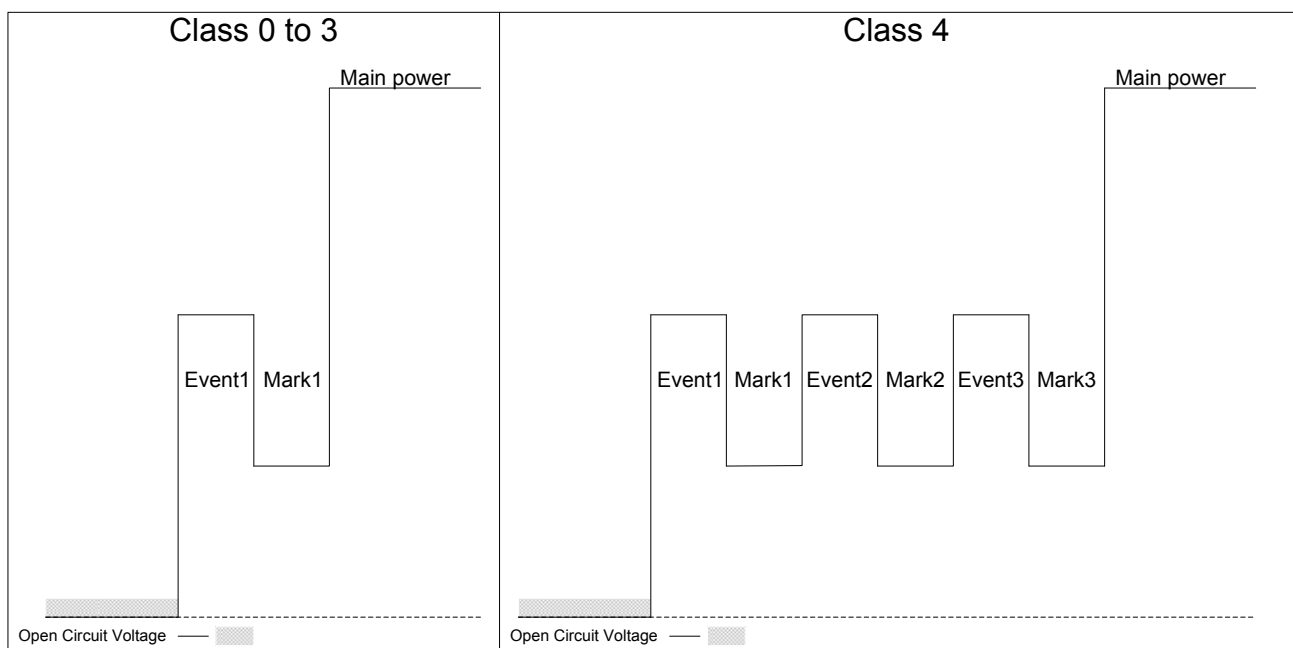


Figure 6: Classification

The Ag6600 the apply the signature and classification check to each port in sequence.

6.1 Classification

Table 2 shows the measured current limits that the Ag6600 uses to assign a classification value.

Measured Current	Classification
0mA to 6.5mA	Class 0
>6.5mA to 14.5mA	Class 1
>14.5mA to 23mA	Class 2
>23mA to 33mA	Class 3
>33mA to 48mA	Class 4
>48mA	Over Current

Table 2: Classification Table

6.2 Maintain Power Signature

On successful completion of a valid signature (and classification) the Ag6600 will apply main power to the Port outputs and the STATUS output will go to Logic 1.

Once main power has been applied, the Ag6600 will constantly monitor the PD to ensure that it is still connected; this is referred to as the Maintain Power Signature (MPS).

The Ag6600 uses the dc detection method of MPS and will remove power if the current drawn falls below the detect threshold. If the Ag6600 Port output current is $\geq 10\text{mA}$ the output will remain on. If the Port output current is $\leq 5\text{mA}$ the output will be turned off and the Ag6600 will return to the signature cycle (looking once again for a valid signature).

6.3 Output Current Limits

The Ag6600 has two over current limits - Current Limit 1* and Current Limit 2*.

The Ag6600 will allow the Port output to exceed Current Limit 1 (but not Current Limit 2) for a short duration – T_{LIM1}^* . If the Port output continues to exceed Current Limit 1; the output power will be removed and the STATUS output will indicate an over-current fault (See Section 7 – STATUS Output).

If the output exceeds Current Limit 2, the Ag6600 will remove power (without waiting for T_{LIM}) and the STATUS output will indicate an over-current fault.

*Note: See Section 10.3 Electrical Characteristics

6.4 Output Power

The Ag6600 is capable of delivering up to 95W, when input supply is set to 56V.

Please note this is not the power available at the input of the Powered Device (PD). There are cable, connector and polarity protection losses to be taking into account.

7. STATUS Output

The STATUS output pin is at Logic 0 when the Port outputs are disconnected. After completion of a valid signature (and classification) the STATUS output will go to Logic 1 at the same time as the Port output applies main power.

When the Port output is disconnected the STATUS output will go to Logic 0, see Figure 7.

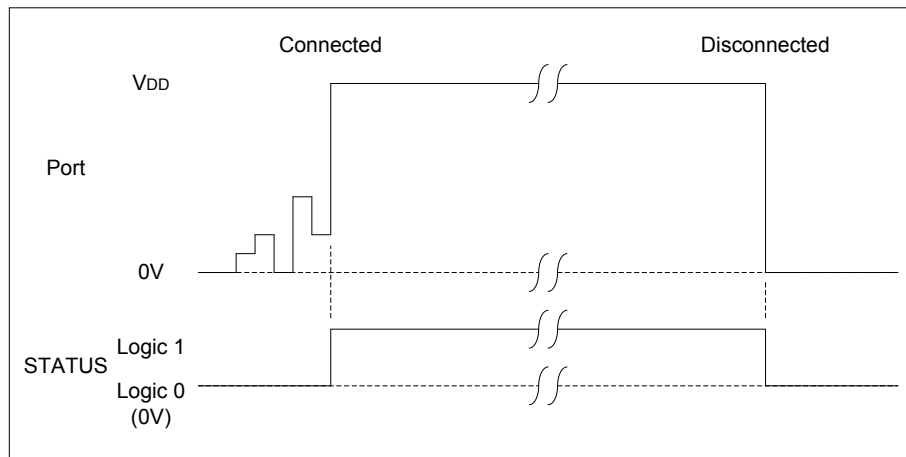


Figure 7: STATUS Output at Port Connect and Disconnect

In addition to the STATUS output reporting when the Port outputs are connected or disconnected, the STATUS output also reports when a fault has been detected.

When a short circuit fault is applied to one or both Port outputs, the STATUS output goes to Logic 0 for 100ms, then generates one 100ms pulse, before returning to Logic 0, see Figure 8.

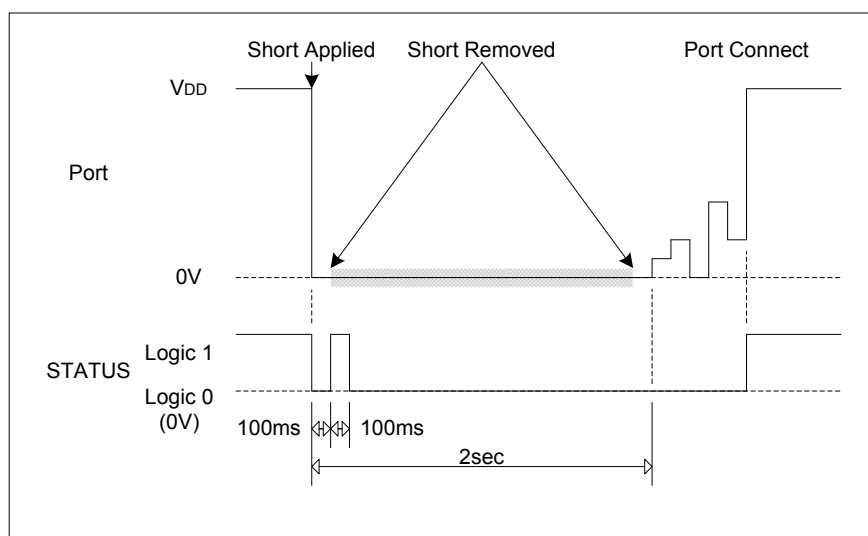


Figure 8: STATUS Output when a Short Circuit is applied to the Output Port

In the example shown in Figure 8, the short circuit is removed at some point before the next Signature and Classification and the Ag6600 resumes normal operation. If the short circuit is not removed the Ag6600 will not pass the next Signature and the Port outputs will remain off.

When an over-current fault is applied to the Port outputs, the STATUS output goes to Logic 0 for 100ms, then generates two 100ms pulses, before returning to Logic 0, see Figure 9.

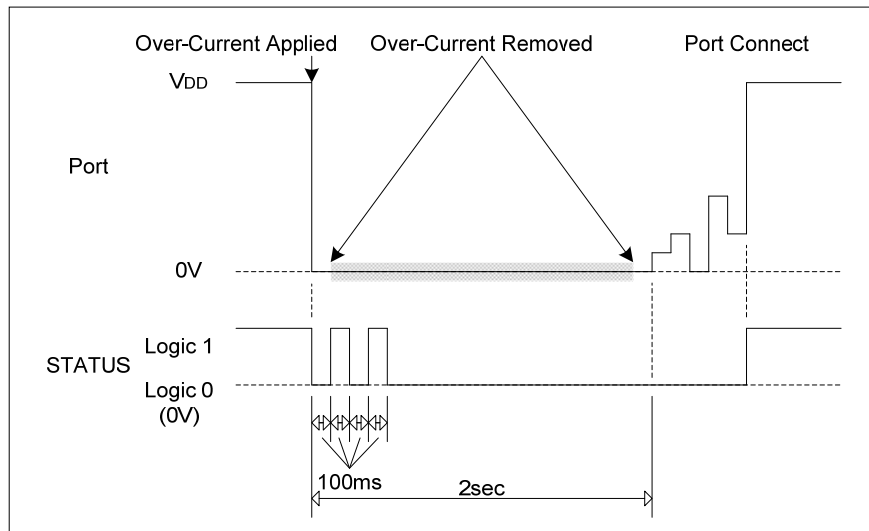


Figure 9: STATUS Output when an Over-Current is applied to the Output Port

In the example shown in Figure 9, the over-current is removed at some point before the next Signature and Classification and the Ag6600 resumes normal operation. If the short circuit is not removed the Ag6600 will start up again and repeat the fault shutdown cycle until the over-current fault is removed, see Figure 10.

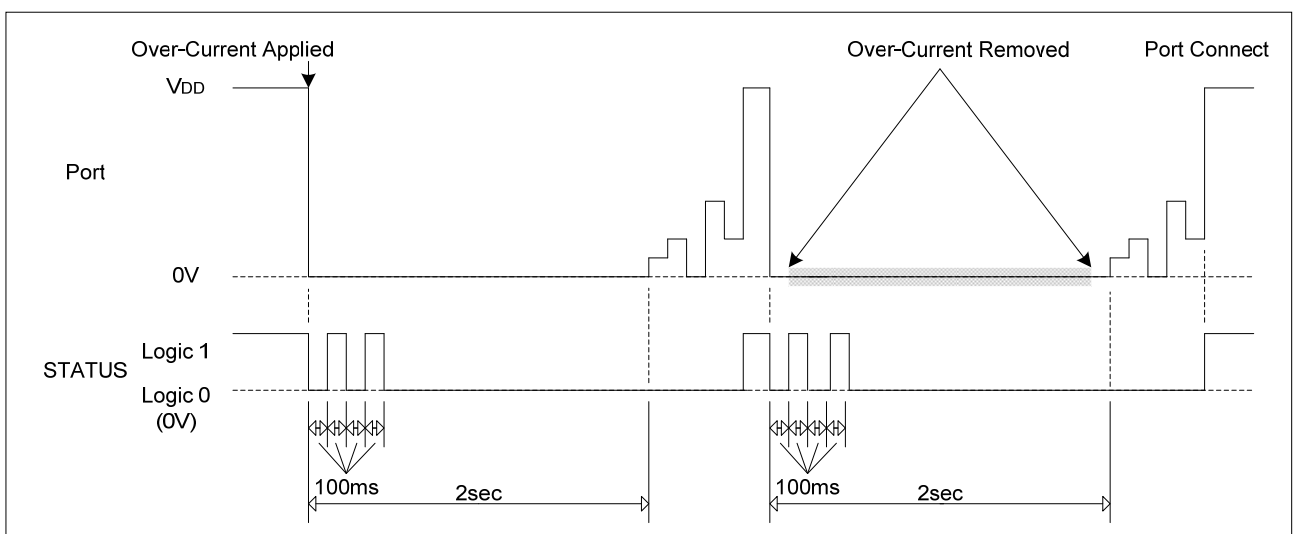


Figure 10: STATUS Output when an Over-Current fault is not removed

In PoH mode, the Ag6600 also checks for an imbalance in output current. If an imbalance of ~120mA is detected between the Port Outputs, the Ag6600 will consider this a fault condition and remove power. The STATUS output will generate 3 pulses, see Figure 11.

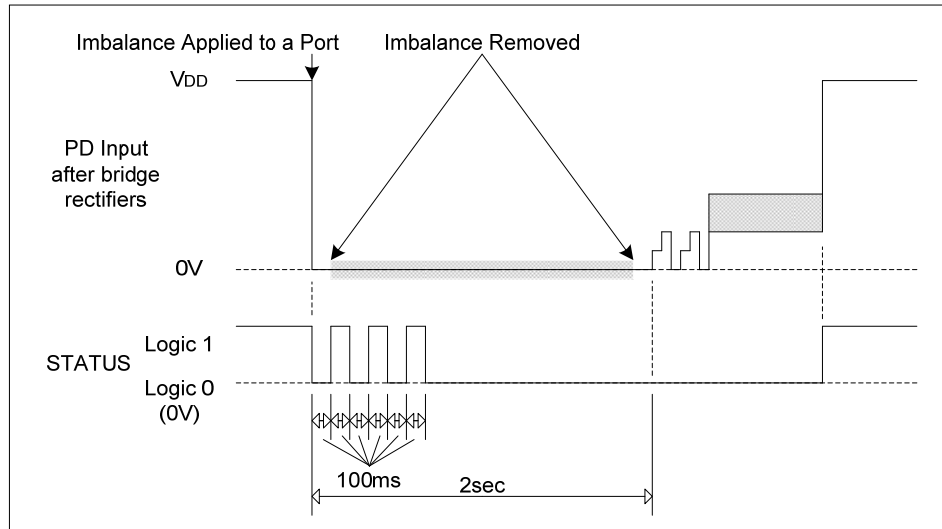


Figure 11: STATUS Output when an imbalance fault is detected

In the example shown in Figure 11, the unbalance fault is removed at some point before the next Signature and Classification and the Ag6600 resumes normal operation.

The Ag6600 STATUS output pin has a limited drive capability. This is sufficient to drive a logic input, but does not have enough power to continually drive an LED. Figure 12 shows a simple circuit to drive an LED from the STATUS output. Over driving the STATUS output can result in damage to the internal 3.5V reference supply.

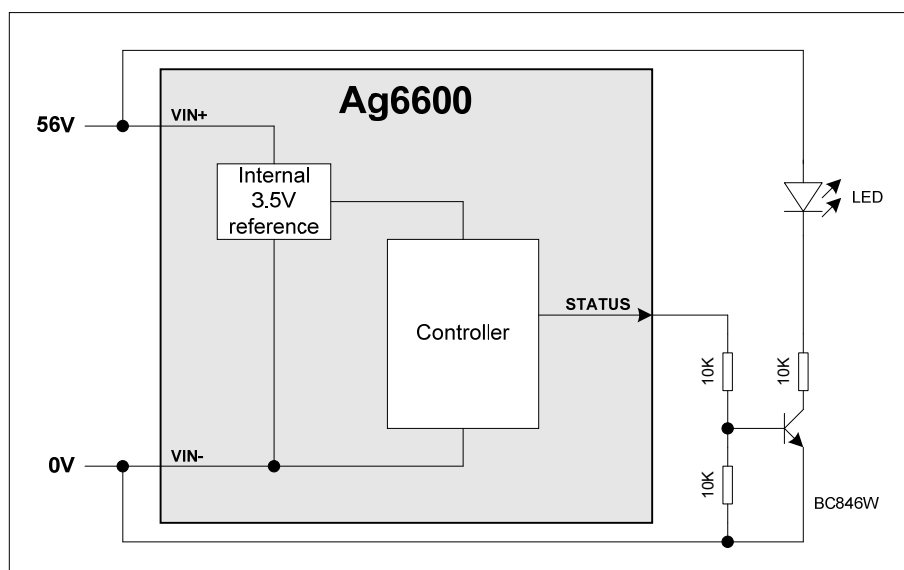


Figure 12: STATUS Output LED drive circuit

8. Typical Connections

The Ag6600 only requires an external supply and PoH compliant data transformer as shown in Figure 13.

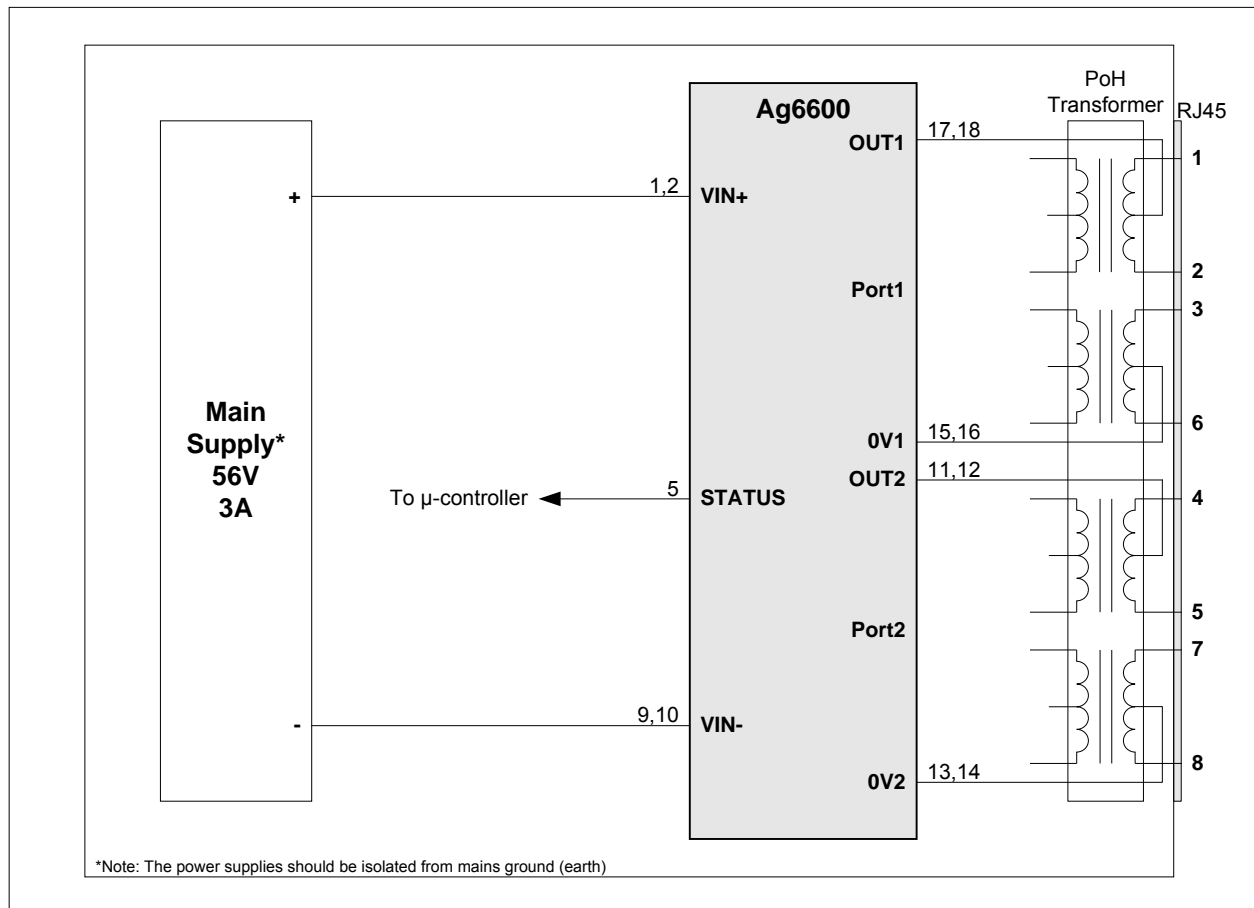


Figure 13: Typical Ag6600 Connection Diagram

9. Protection

9.1 Input Protection

The Ag6600 has built-in Tranzorb diode across its input, to protect the module from transients from the power supply.

9.2 Output Short-Circuit Protection

In addition to the over-current protection the Ag6600 has built-in output short-circuit protection.

If the Port output is shorted, the Ag6600 will limit the current and remove the power, the STATUS output will indicate a short-circuit fault.

10. Electrical Characteristics

10.1 Absolute Maximum Ratings¹

	Parameter	Symbol	Min	Max	Units
1	DC Supply Voltage	V_{DD}	-0.3	60	V
2	Storage Temperature	T_S	-40	+100	$^{\circ}\text{C}$

Note 1: Exceeding the above ratings may cause permanent damage to the product. Functional operation under these conditions is not implied. Maximum ratings assume free airflow.

10.2 Recommended Operating Conditions

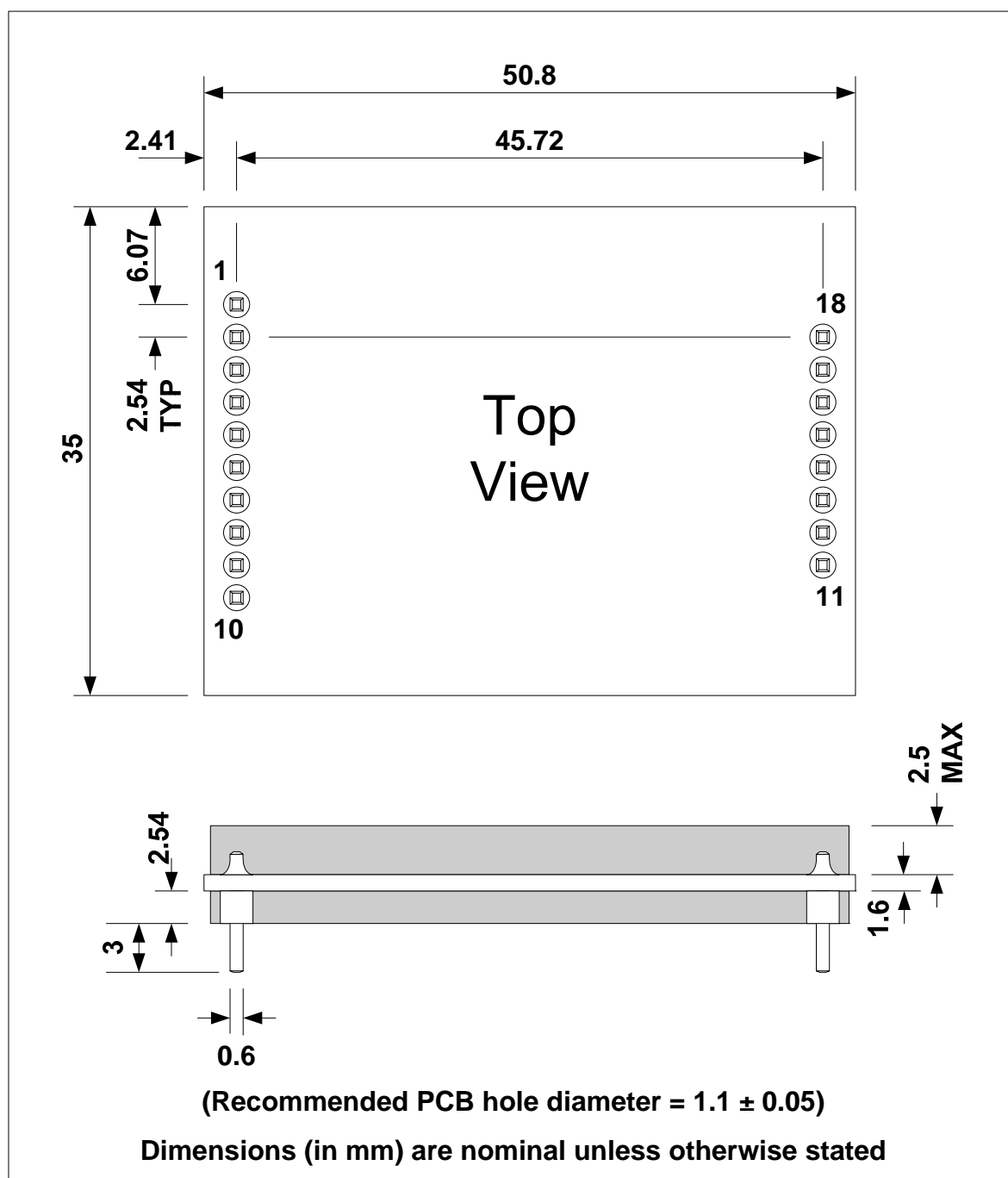
	Parameter	Symbol	Min	Typ	Max	Units
1	Input Supply Voltage	V_{DD} (Class 0 - 3) V_{DD} (Class 4)	45 52		57 57	V V
2	Standard Operating Temperature -	T_{OP}	0	25	70	$T_a / ^{\circ}\text{C}$

10.3 Electrical Characteristics

	Parameter	Sym	Min	Typ ¹	Max	Units	Condition
1	V _{DD} Idle Supply Current	I _{DD}			15	mA	
2	Signature Detection Voltage	V _{SIGL} V _{SIGH}	2.7	4.5 9	10.1	V V	
3	Minimum Valid Signature	R _{SIGL}	15			kΩ	
4	Maximum Valid Signature	R _{SIGH}			32	kΩ	
5	Classification Voltage	V _{CLASS}	14.5		20.5	V	
6	Classification Mark Voltage	V _{MARK}	6.9		10	V	
7	Classification Threshold Current	I _{CLASS}	5.5 13.5 21.5 31.5 45.2	6.5 14.5 23 33 48	7.5 15.5 24.5 34.9 50.8	mA mA mA mA mA	Class 0 - 1 Class 1 - 2 Class 2 - 3 Class 3 - 4 Class 4 - Over-current
8	Maintain Power Signature	V _{MPS}	5		10	mA	Per Port
9	Maximum Output Power	P _{MAX}		21 95		W W	Class 0 - 3 Class 4
10	Current Limit 1	I _{LIM1}		375 1830		mA mA	Class 0 - 3 Class 4
11	Current Limit 2	I _{LIM2}		475 1930		mA mA	Class 0 - 3 Class 4
12	Current Limit 1 Cut-Off Time	T _{LIM1}	50 10			ms ms	Class 0 - 3 Class 4
13	STATUS Output	V _{OH} V _{OL}		3.5 0.3		V V	@ -0.5mA @ 0.5mA

Note 1: Typical figures are at 25°C with a nominal 56V supply.

11. Package



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