PEP01-5841

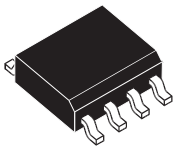
Power over ethernet power supply protection

Features

- Peak pulse power: up to 2.7 kW (8/20 µs)
- Stand-off voltage: 58 V
- 4 unidirectional Transils™ and 4 decoupling capacitances
- Low clamping voltage: 100 V
- Low leakage current:
  - 0.2 µA at 25 °C
  - 1 µA at 85 °C
- Operating T_j max: 150 °C
- JEDEC registered package outline

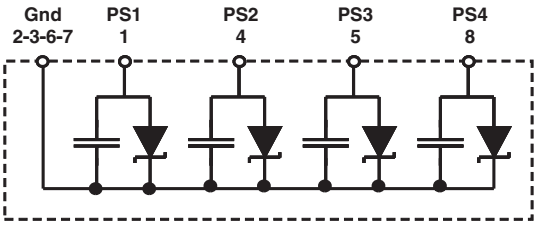
Complies with the following standards

- IEC61000-4-2 level 4
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- IEC61000-4-5 level 2
  - +/- 1 kV 42 Ω
- IEEE 802.3af-2003
- IEEE 802.3at-2008



SO-8 package
PEP01-5841

Figure 1. Functional diagram



Description

The PEP01-5841 has been designed to protect power over ethernet PSE equipment against line overvoltages. It embeds 4 decoupling capacititors to stabilize power supplies.

It is compatible with IEEE 802.3af-2003 and IEEE 802.3at-2008 requirements and it allows PoE based systems to be protected against both electrical overstress (EOS) and electrostatic discharges (ESD) according to IEC61000-4-5 and IEC61000-4-2.

The low clamping voltage (100 V) makes it compatible with PMOS and PSE controller technologies. Developed in Planar technology, it provides high reliability level.

Packaged in SO-8, this minimizes PCB consumption (footprint in accordance with the IPC 7531 standard).

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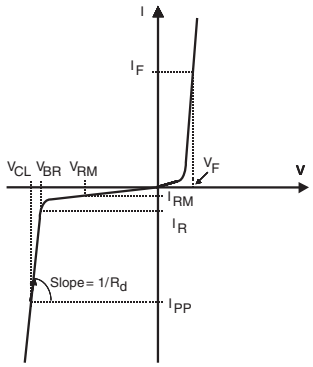
1 Characteristics

Table 1. Absolute ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage (IEC61000-4-2 contact discharge)		30	kV
P_{PP}	Peak pulse power dissipation	T_j initial = T_{amb}	2700	W
T_{stg}	Storage temperature range		-65 to + 150	°C
T_j	Operating junction temperature range		-55 to + 150	°C
T_L	Maximum lead temperature for soldering during 10 s.		260	°C

Table 2. Electrical characteristics definitions(T_{amb} = 25 °C)

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current @ V_{RM}
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
C	Capacitance
R_D	Dynamic impedance



Type	I_{RM} max@V_{RM}			V_{BR} @I_R (1)				8/20 µs			C	αT(3)
								V_{CL} @I_{PP}		R_D(2)		
	25 °C	85 °C		min.	typ.	max.		max.			typ.	max.
	µA	µA	V	V			mA	V	A	Ω	pF	10^{-4} °C
PEP01-5841	0.2	1	58	64.4	67.8	71.2	1	100	24	1.2	55	10.4

1. Pulse test: t_p < 50 ms
2. To calculate maximum clamping voltage at other surge level, use the following formula:
   $V_{CLmax} = R_D \times I_{PP} + V_{BRmax}$
3. To calculate V_{BR} versus junction temperature, use the following formula:
   $V_{BR\ @\ TJ} = V_{BR\ @\ 25\ °C} \times (1 + \alpha T \times (T_J - 25))$

Figure 2. Pulse waveform

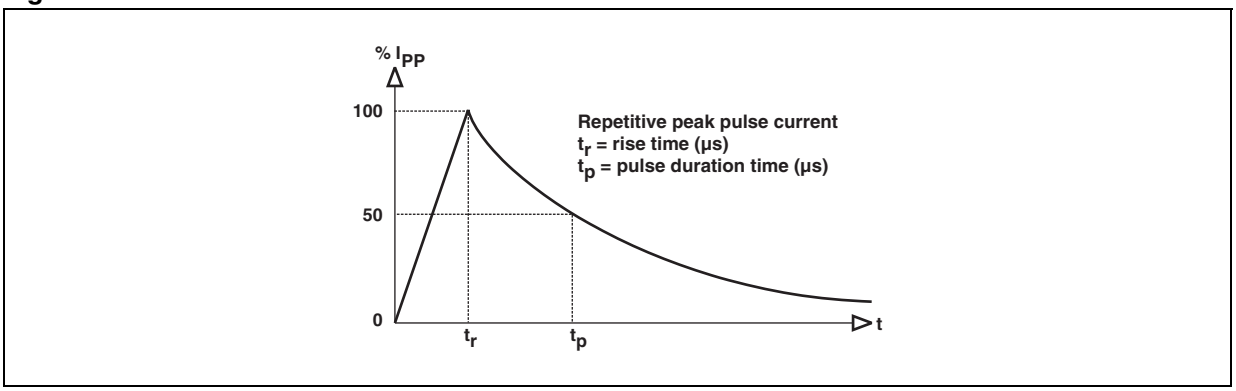


Figure 3. Peak power dissipation versus initial junction temperature

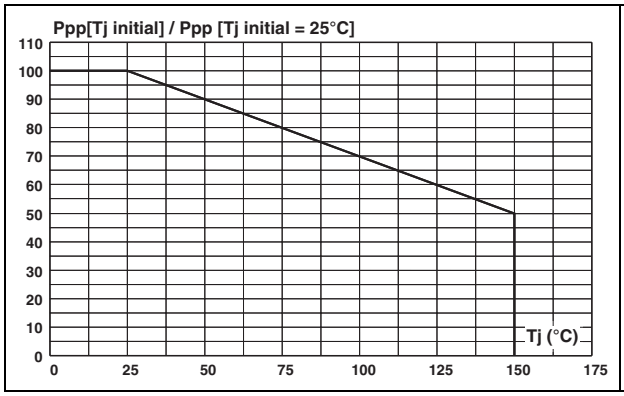


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

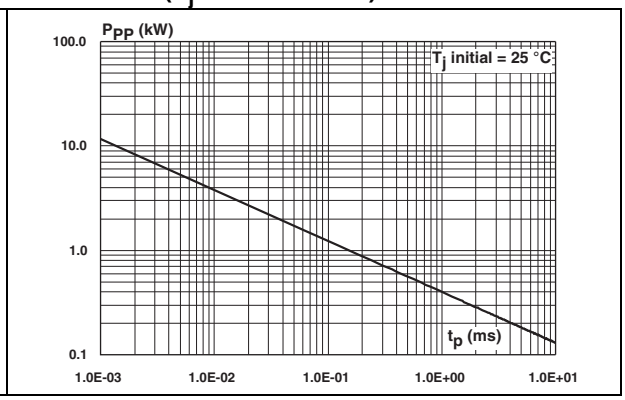


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

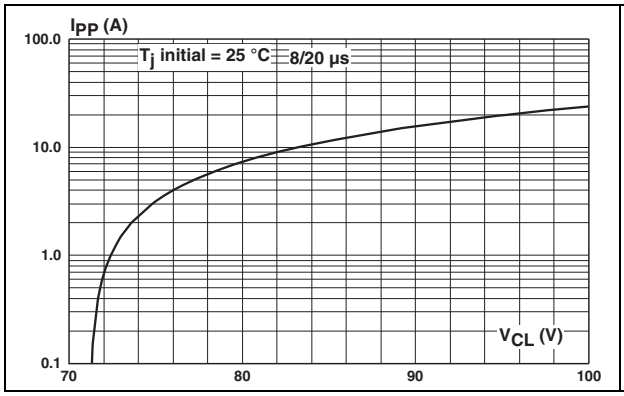


Figure 6. Capacitance versus voltage (typical values)

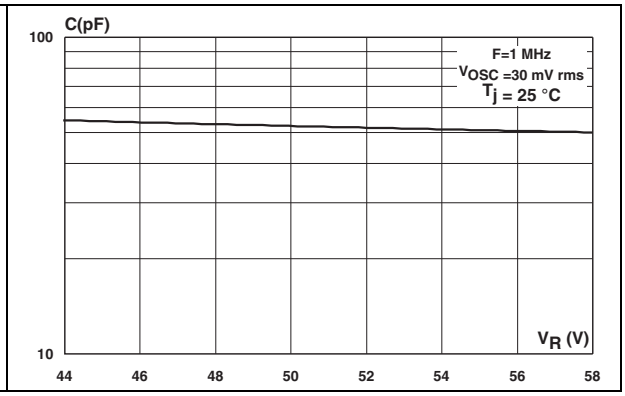


Figure 7. Peak forward voltage drop versus peak forward current (typical values)

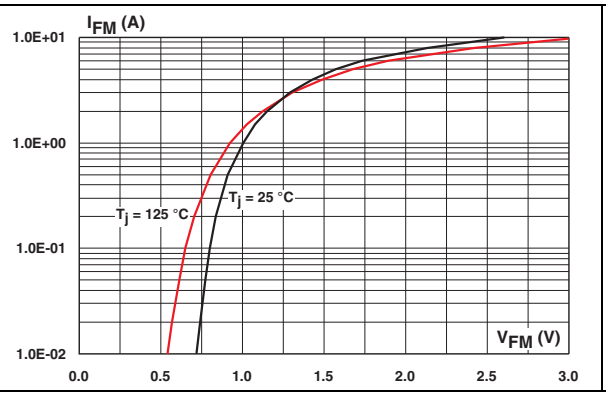


Figure 8. Relative variation of thermal impedance junction to ambient versus pulse duration

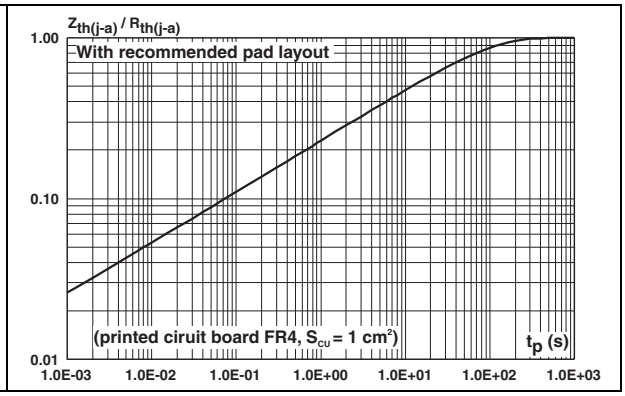
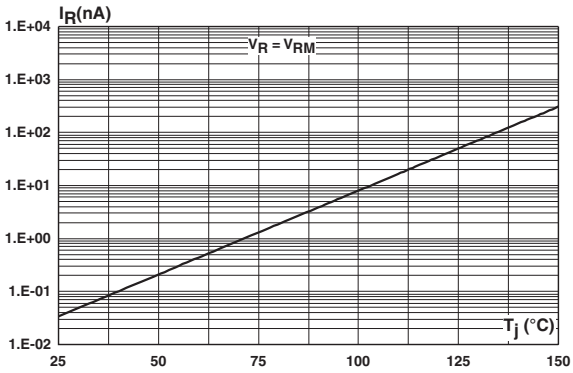


Figure 9. Leakage current versus junction temperature (typical values)



2 Application

Figure 10. Typical application circuit with PMOS integrated in PSE controller

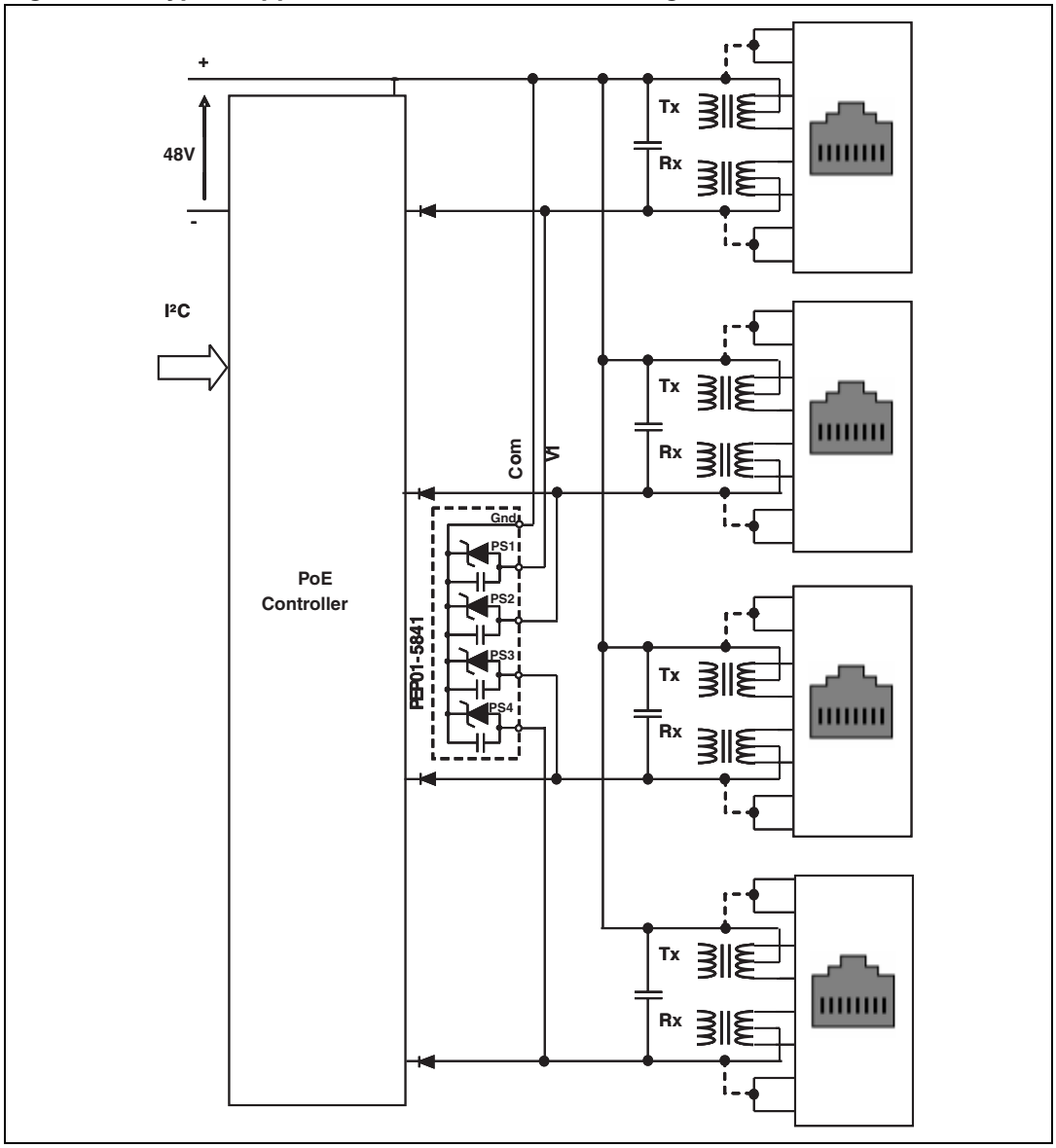


Figure 11. Typical application circuit with external PMOS

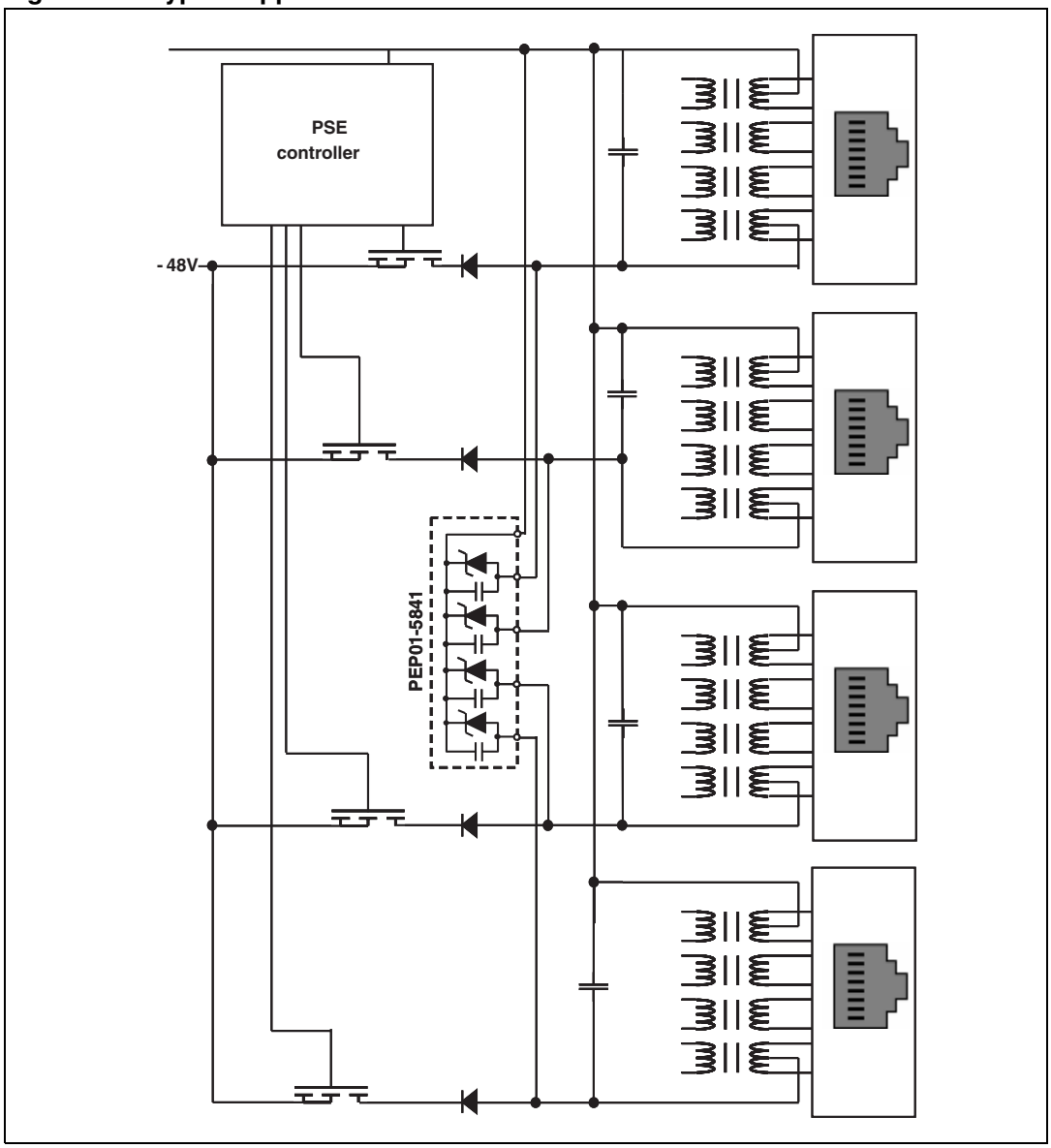
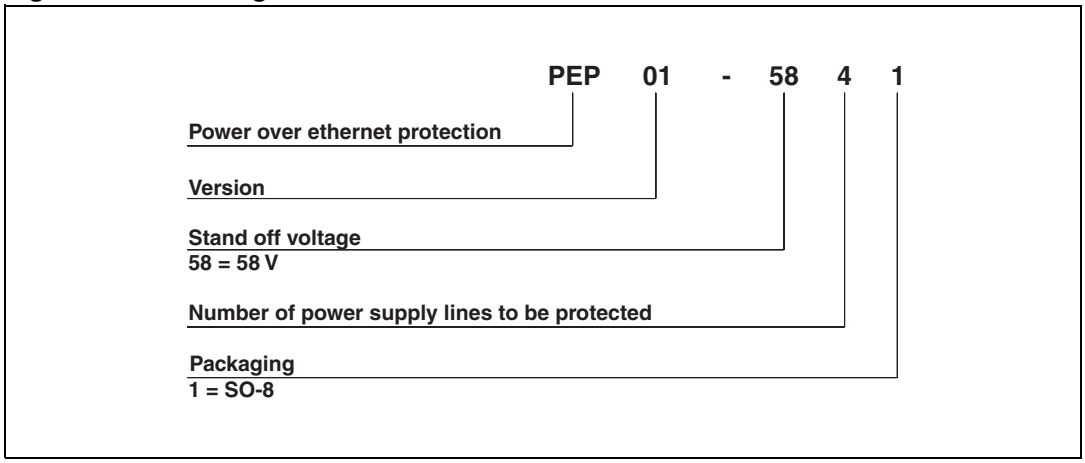


Figure 10 and *11* shows typical application schematics of PoE network. Power sourcing equipment (PSE) allows communication and power sourcing for several power devices (PD). The number of ways is generally a multiple of 4, this optimizes the PEP01-5841 for track layout and crosstalk, as well as PCB surface occupation. This protection device has been studied to comply with the latest IEEE 802.3af-2003 requirements and to withstand the surge defined in the IEC 61000-4-5 level 4 requirements.

3 Ordering information scheme

Figure 12. Ordering information scheme

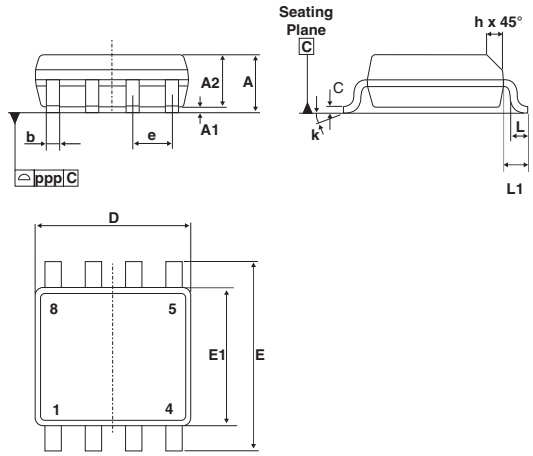


4 Package information

- Case: JEDEC SO-8 molded plastic over planar junction
- Terminals: solder plated, solderable according to MIL-STD-750, Method 2026
- Flammability: epoxy is rated UL94V-0
- RoHS package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

Table 3. SO-8 dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	-	1.75	-	-	0.069
A1	0.1	-	0.25	0.004	-	0.010
A2	1.25	-	-	0.049	-	-
b	0.28	-	0.48	0.011	-	0.019
C	0.17	-	0.23	0.007	-	0.009
D	4.80	4.90	5.00	0.189	0.193	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	-	1.27	-	-	0.050	-
h	0.25	-	0.50	0.010	-	0.020
L	0.40	-	1.27	0.016	-	0.050
L1	-	1.04	-	-	0.041	-
k	0°	-	8°	0°	-	8°
ppp	-	-	0.10	-	-	0.004

Figure 13. Footprint recommendations

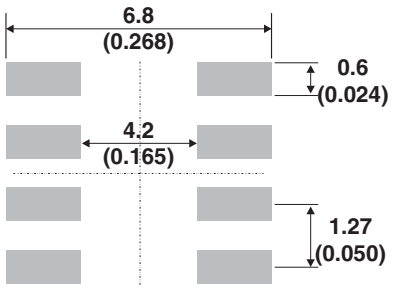
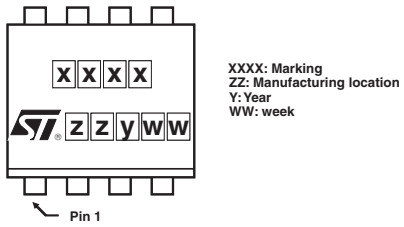


Figure 14. Marking



5 Ordering information

Table 4. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
PEP01-5841	58E1	SO-8	78 mg	2000	Tape and reel

6 Revision history

Table 5. Document revision history

Date	Revision	Changes
06-May-2009	1	Initial release.
14-May-2009	2	Standards compliance updated.

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