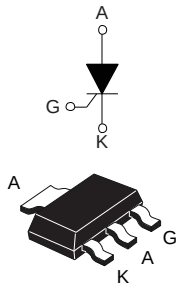
P0111MN

Sensitive 0.8 A SCR thyristor

Datasheet - production data



SOT-223

Features

- $I_{T(RMS)}$ 0.8 A
- 125 °C max T_j
- Low 0.004 to 0.025 mA gate current
- 600 V V_{DRM}/V_{RRM}
- ECOPACK®2 compliant component

Applications

- Proximity sensors
- Gate driver for large thyristors
- Overvoltage crowbar protection
- Ground fault circuit interrupters
- Arc fault circuit interrupter
- Solid state relay pilot circuit
- Standby mode power supplies
- Residual current detector

Description

Thanks to highly sensitive triggering levels, the 0.8 A P0111MN SCR thyristor is suitable for all applications where available gate current is limited. This device offers a high blocking voltage of 600 V, ideal for applications like interrupters circuits.

The surface mount SOT-223 package allows compact, SMD based designs for automated manufacturing.

Table 1: Device summary

Symbol	Value	Unit
$I_{T(RMS)}$	0.8	A
V_{DRM}/V_{RRM}	600	V
I_{GT}	0.004 to 0.025	mA
T_j max.	125	°C

1 Characteristics

Table 2: Absolute maximum ratings (limiting values), T_j = 25 °C unless otherwise specified

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_{amb} = 70 °C	0.8	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			0.5	
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C)		t_p = 8.3 ms	8	A
			t_p = 10 ms	7	
I^2t	I^2t value for fusing		t_p = 10 ms	0.24	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, t_r ≤ 100 ns	f = 60 Hz	T_j = 125 °C	50	A/µs
V_{DRM}/V_{RRM}	Repetitive peak off-state voltage		T_j = 125 °C	600	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	1	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	0.1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature			-40 to +125	°C

Table 3: Electrical characteristics (T_j = 25 °C unless otherwise specified)

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 140 Ω		Min. - Max.	0.004 to 0.025	mA
V_{GT}			Max.	0.8	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ, R_{GK} = 1000 Ω	T_j = 125 °C	Min.	0.1	V
V_{RG}	I_{RG} = 10 µA		Min.	8	V
I_H	I_T = 50 mA, R_{GK} = 1000 Ω		Max.	5	mA
I_L	I_G = 1.2 x I_{GT}, R_{GK} = 1000 Ω		Max.	6	mA
dV/dt	V_D = 67 % V_{DRM}, R_{GK} = 1000 Ω	T_j = 125 °C	Min.	80	V/µs

Table 4: Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 1.6 A, t_p = 380 µs	T_j = 25 °C	Max.	1.95	V
V_{TO}	Threshold voltage	T_j = 125 °C	Max.	0.95	
R_D	Dynamic resistance	T_j = 125 °C	Max.	600	mΩ
I_{DRM}/I_{RRM}	V_D = V_{DRM}, V_R = V_{RRM}, R_{GK} = 1000 Ω	T_j = 25 °C	Max.	10	µA
		T_j = 125 °C		100	

Table 5: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-t)}$	Junction to tab (DC)		30	
$R_{th(j-a)}$	Junction to ambient (DC)	S[(1)] = 5 cm²	60	°C/W

Notes: [(1)]S = copper surface under tab.

1.1 Characteristics (curves)

Figure 1: Maximum average power dissipation versus average on-state current

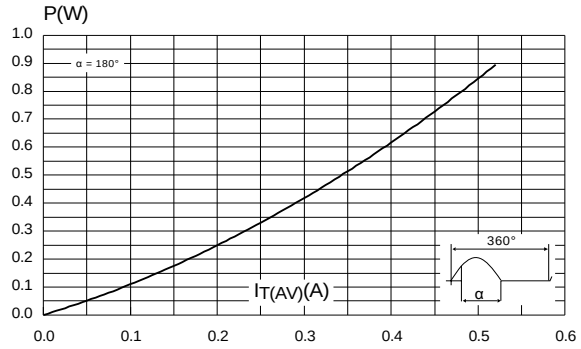


Figure 2: Average and DC on-state current versus case temperature

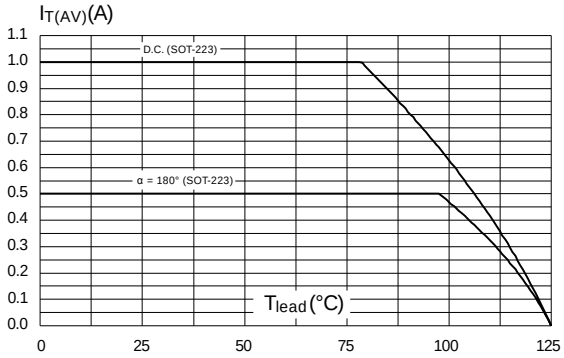


Figure 3: Average and DC on-state current versus ambient temperature

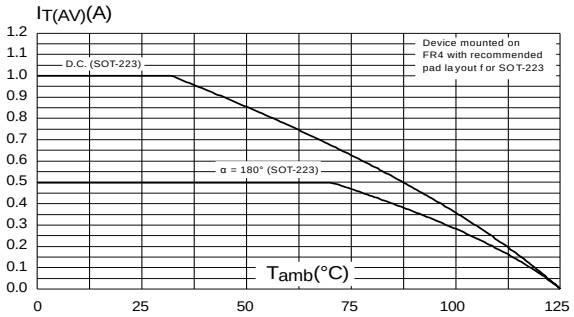


Figure 4: Relative variation of thermal impedance versus pulse duration

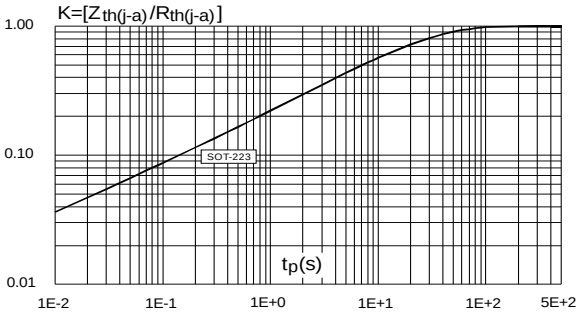


Figure 5: Relative variation of gate trigger current and gate voltage versus junction temperature (typical values)

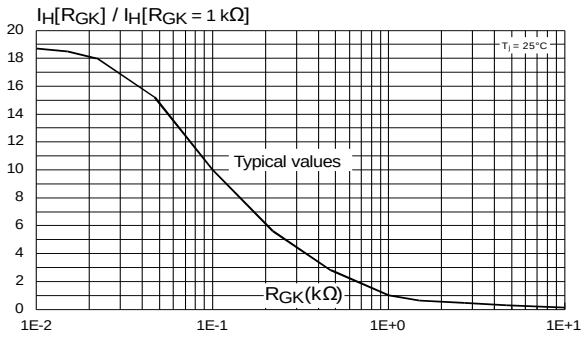


Figure 6: Relative variation of holding and latching current versus junction temperature (typical values)

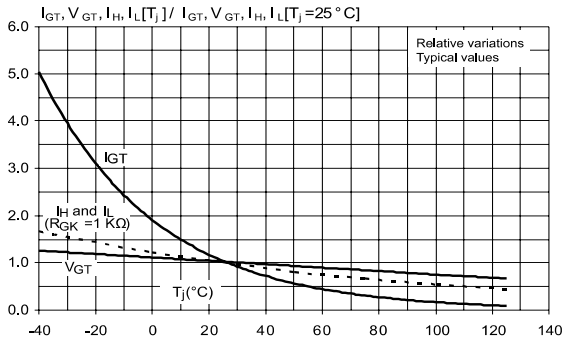


Figure 7: Relative variation of static dV/dt immunity versus gate-cathode resistance (typical values)

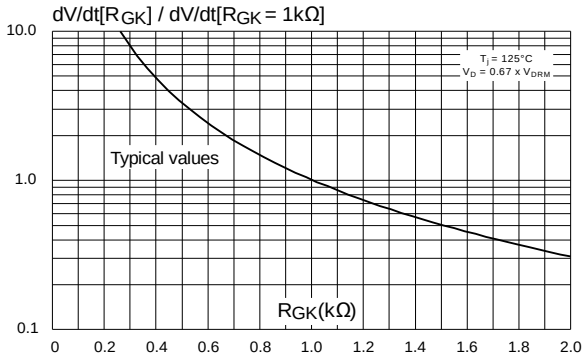


Figure 8: Relative variation of static dV/dt immunity versus junction temperature (typical values)

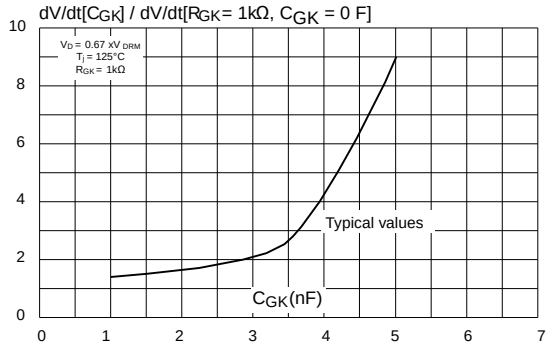


Figure 9: Surge peak on-state current versus number of cycles

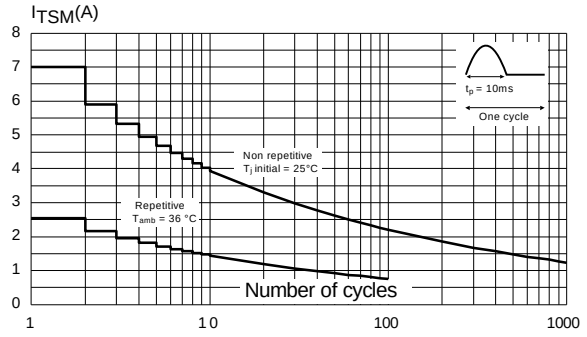


Figure 10: Non-repetitive surge peak on-state current for sinusoidal pulse (t_p < 10 ms)

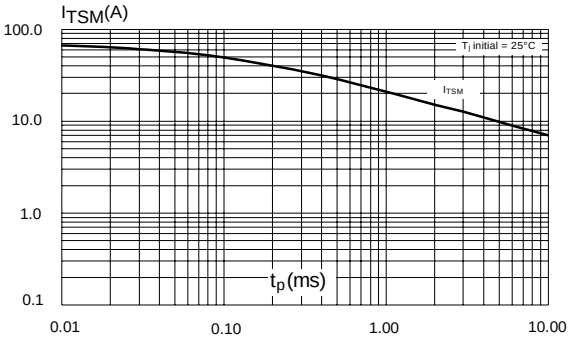


Figure 11: On-state characteristics (maximum values)

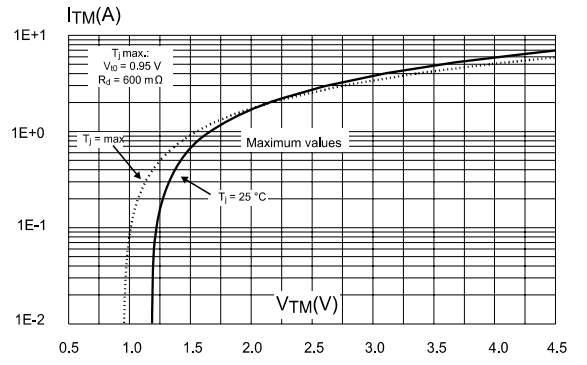
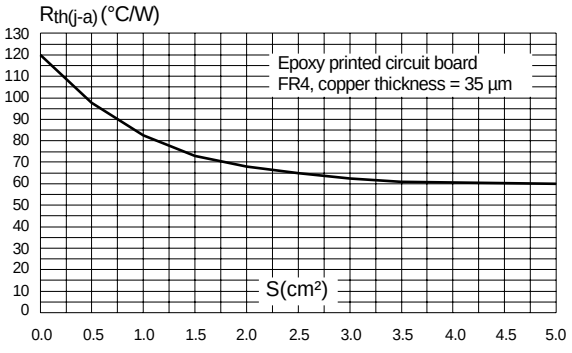


Figure 12: Thermal resistance junction to ambient versus copper surface tab



2 Package information

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.

- Lead-free package
- Halogen free molding resin
- Epoxy meets UL94, V0

2.1 SOT-223 package information

Figure 13: SOT-223 package outline

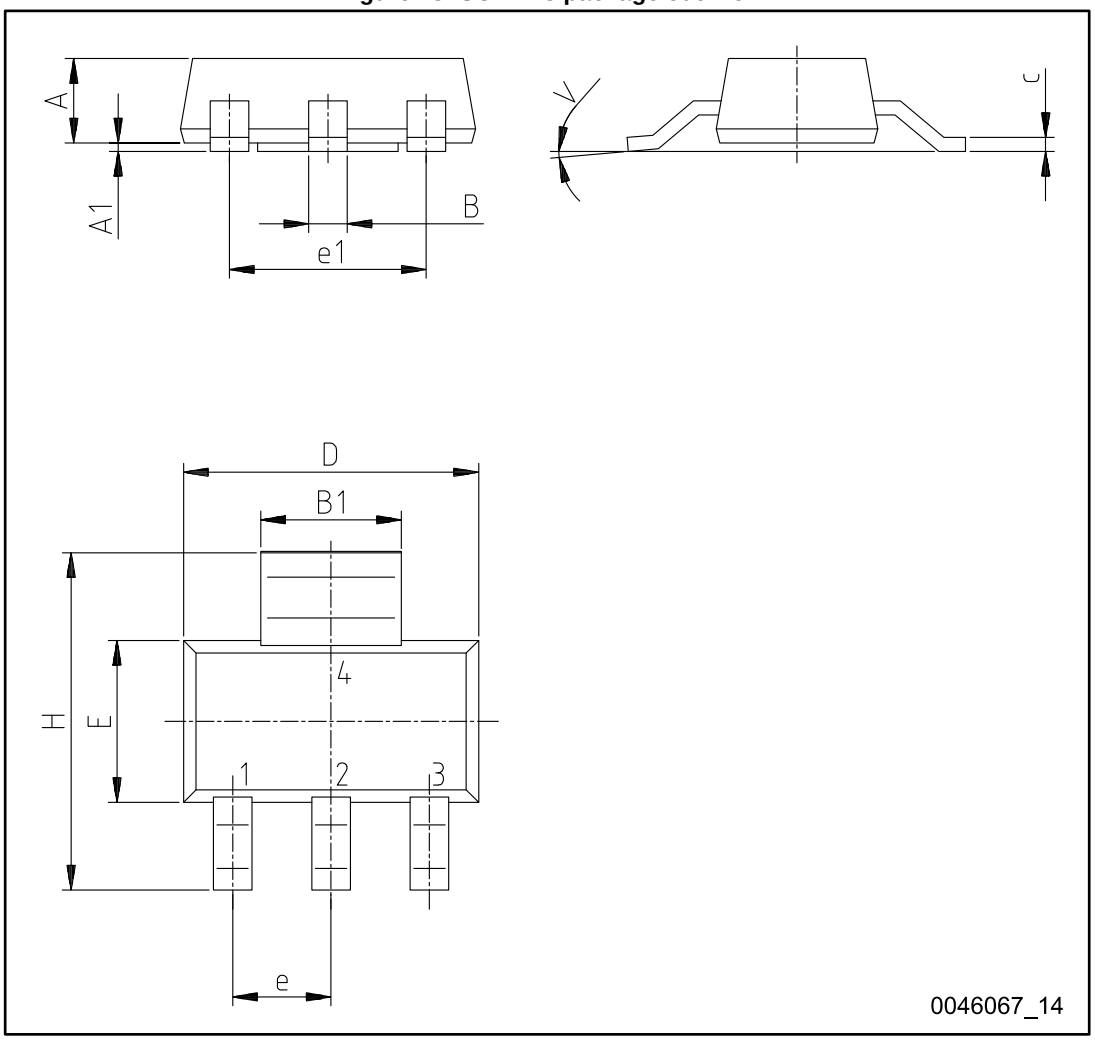


Table 6: SOT-223 package mechanical data

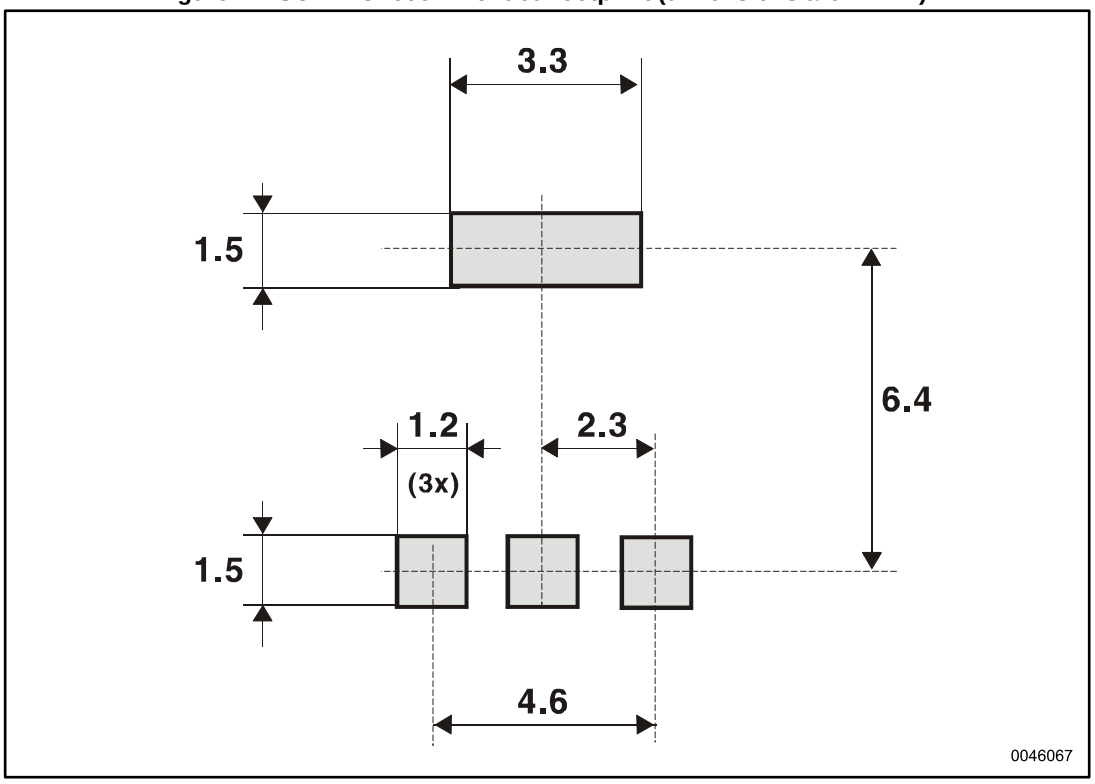
Dim.	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.8			0.0709
A1	0.02		0.1	0.0008		0.0039
B	0.6	0.7	0.85	0.0236	0.0276	0.0335
B1	2.9	3	3.15	0.1142	0.1181	0.1240
c	0.24	0.26	0.35	0.0094	0.0102	0.0138
D[2]	6.3	6.5	6.7	0.2480	0.2559	0.2638
e		2.3			0.0906	
e1		4.6			0.1811	
E	3.3	3.5	3.7	0.1299	0.1378	0.1457
H	6.7	7.0	7.3	0.2638	0.2756	0.2874
V			10º			10°

Notes:

(1)Inches dimensions given only for reference

(2)Does not include mold flash or protusions. Mold flash or protusions must not exceed 0.15 mm (0.006 inches)

Figure 14: SOT-223 recommended footprint (dimensions are in mm)



3 Ordering information

Figure 15: Ordering information scheme

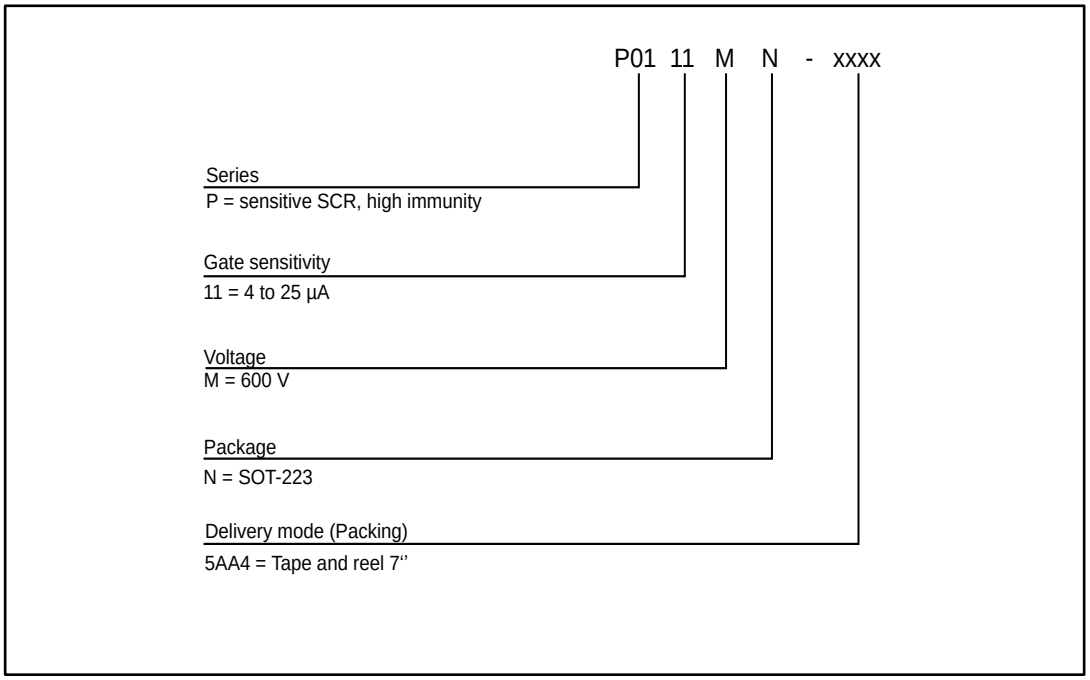


Table 7: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
P0111MN 5AA4	P1M	SOT-223	0.12 g	1000	Tape and reel 7"

4 Revision history

Table 8: Document revision history

Date	Revision	Changes
09-Oct-2017	1	Initial release.

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