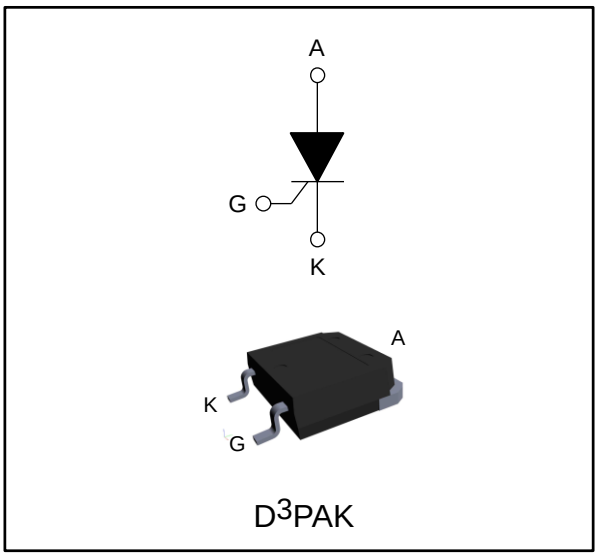
TM8050H-8D3

80 A high temperature Thyristor (SCR)

Datasheet - production data



Features

- High junction temperature: T_j = 150 °C
- Blocking voltage: V_{DRM} = V_{RRM} = 800 V
- Nominal current: $I_{T(RMS)}$ = 80 A
- Gate triggering current: I_{GT} max. = 50 mA
- High noise immunity: dV/dt > 1 kV/µs
- Surface mounted device D^{3}PAK
- Increase of thermal margin due to extended T_j up to 150 °C
- Low I_D and I_R in blocking state
- High compact power SMD design

Applications

- AC-DC rectifier controlled bridge
- Motorbike voltage regulator
- Variable speed motor drive
- Battery charging system
- AC solid state relay
- By-pass switch of UPS
- Industrial welding systems
- Motor soft starter

Description

Available in high power package (D^{3}PAK), the device is suitable in applications where power switching ($I_{T(RMS)}$ = 80 A at T_C = 130 °C) and power dissipation (V_{TM} = 1.55 V at 160 A) are critical, such as motorbike voltage regulator, by-pass AC switch, controlled rectifier bridge, solid state relay, battery charger, welding equipment and motor driver applications. The TM8050H-8D3 is available in surface mount D^{3}PAK package.

Table 1: Device summary

Symbol	Value
$I_{T(RMS)}$	80 A
V_{DRM}/V_{RRM}	800 V
I_{GT}	50 mA
T_j	150 °C

1 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	RMS on-state current (180 ° conduction angle)		T_C = 130 °C	80	A
$I_{T(AV)}$	Average on-state current (180 ° conduction angle)			50	A
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j initial = 25 °C	731	A
		t_p = 10 ms		670	
I^2t	I^2t value for fusing		T_j = 25 °C	2245	A^2s
V_{RRM} / V_{DRM}	Maximum repetitive symmetric blocking voltage			800	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , tr ≤ 100 ns	f = 50 Hz	T_j = 25 °C	200	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 150 °C	8	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 150 °C	1	W
V_{RGM}	Maximum peak reverse gate voltage			5	V
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Maximum operating junction temperature			-40 to +150	°C
T_L	Maximum lead temperature during 10 to 30 s duration			245	°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 = 33 Ω		Min.	2.5	mA
			Max.	50	
V_{GT}	V_D = 12 V, R_L = 33 Ω		Max.	1.5	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ	T_j = 150 °C	Min.	0.2	V
I_H	I_T = 500 mA, gate open		Max.	100	mA
I_L	I_G = 1.2 x I_{GT}		Max.	125	mA
t_{gt}	I_T = 80 A , V_D = V_{DRM}, I_G = 200 mA, dI_G/dt = 0.2 A/µs		Typ.	3	µs
dV/dt	V_D = 67 % V_{DRM}, gate open	T_j = 150 °C	Min.	1000	V/µs
t_q	I_T = 33 A, dI_T/dt = 10 A/µs, V_R = 75 V, V_D = 400 V, dV_D/dt = 20 V/µs, t_P = 100 µs	T_j = 150 °C	Max.	150	µs
V_{TM}	I_{TM} = 160 A, t_P = 380 µs	T_j = 25 °C	Max.	1.55	V
V_{TO}	Threshold voltage	T_j = 150 °C	Max.	0.85	V
R_D	Dynamic resistance	T_j = 150 °C	Max.	5.5	mΩ
I_{DRM}	V_D = V_{DRM} = V_R = V_{RRM} = 800 V	T_j = 25 °C	Max.	20	µA
I_{RRM}		T_j = 150 °C	Max.	2.5	mA

Table 4: Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (DC, max.)	D^3PAK	0.25	°C/W
$R_{th(j-a)}$	Junction to ambient (DC, typ., S_{cu} = 2.1 cm^2)		40	

1.1 Characteristics (curves)

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

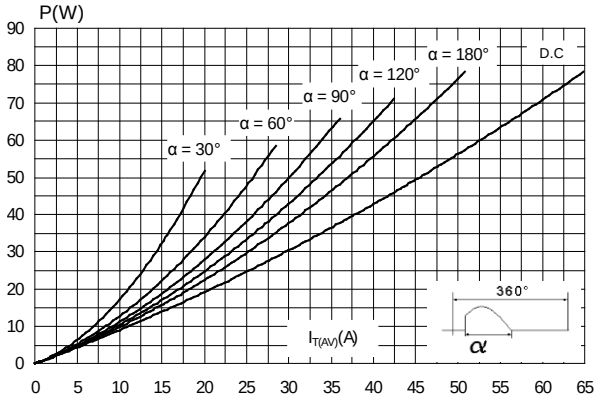


Figure 2: Average and DC on-state current versus case temperature

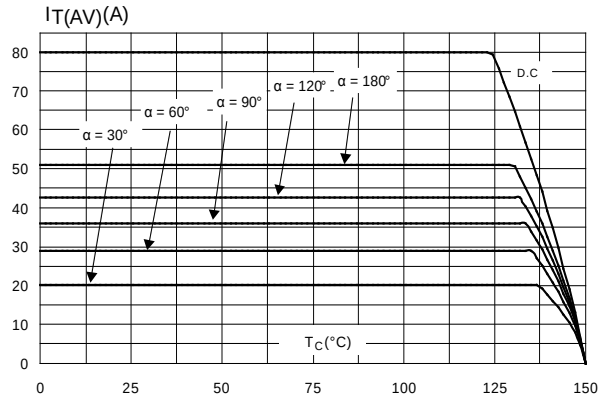


Figure 3: On-state characteristics (maximum values)

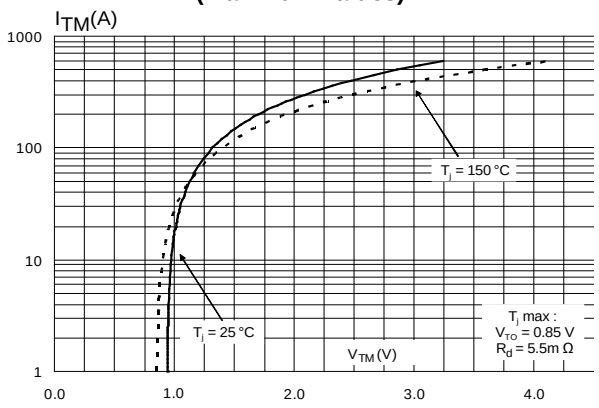


Figure 4: Average and DC on-state current versus ambient temperature

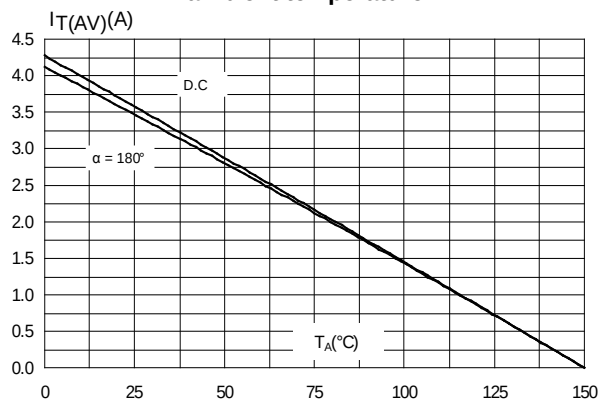


Figure 5: Relative variation of thermal impedance versus pulse duration

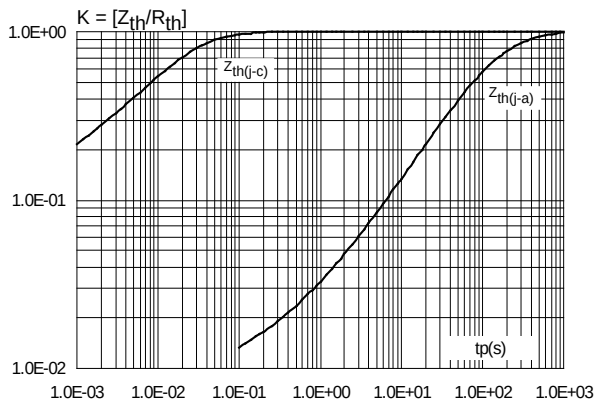


Figure 6: Thermal resistance junction to ambient versus copper surface under tab (D³PAK printed circuit board FR4, copper thickness: 35 µm)

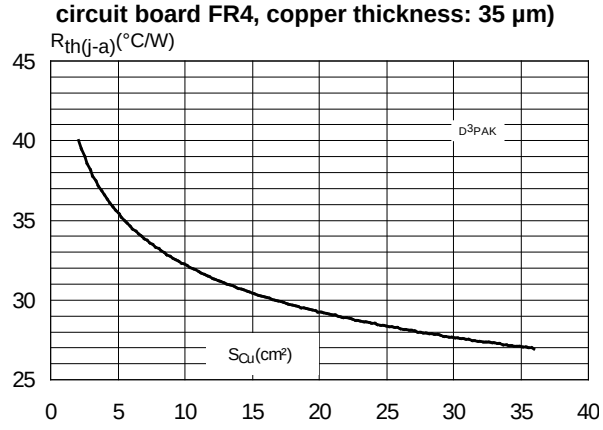


Figure 7: Surge peak on-state current versus number of cycles

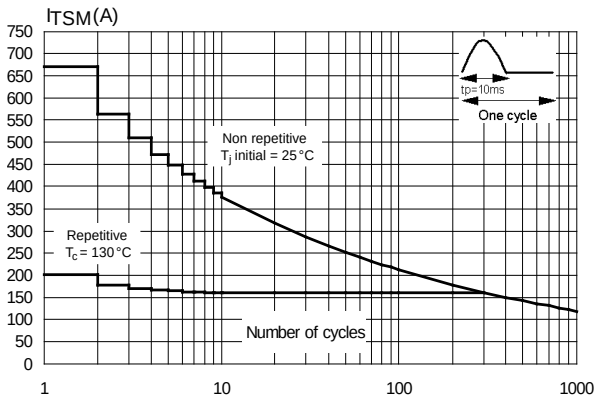


Figure 8: Non repetitive surge peak on-state current for a half cycle sine pulse versus pulse width (t_p < 10 ms)

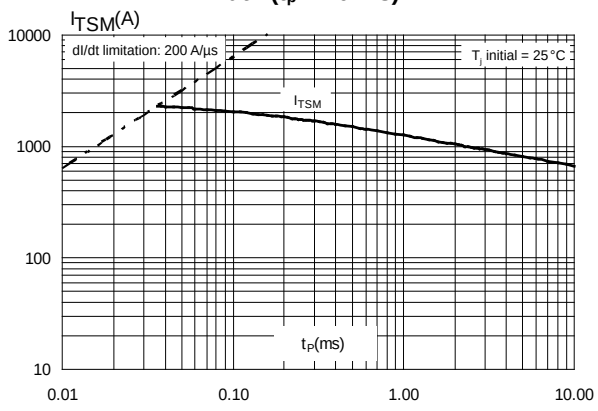


Figure 9: Relative variation of holding current and latching current versus junction temperature (typical values)

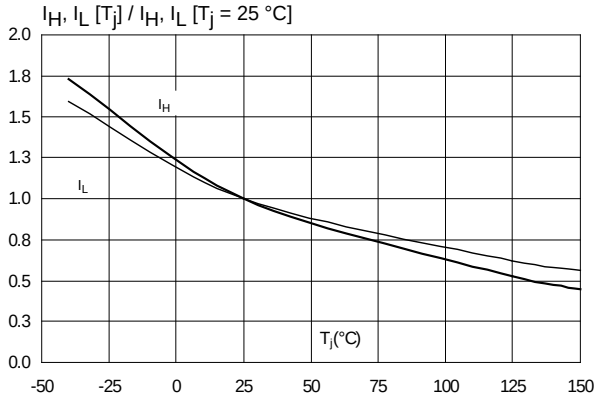


Figure 10: Relative variation of gate trigger current and gate voltage versus junction temperature

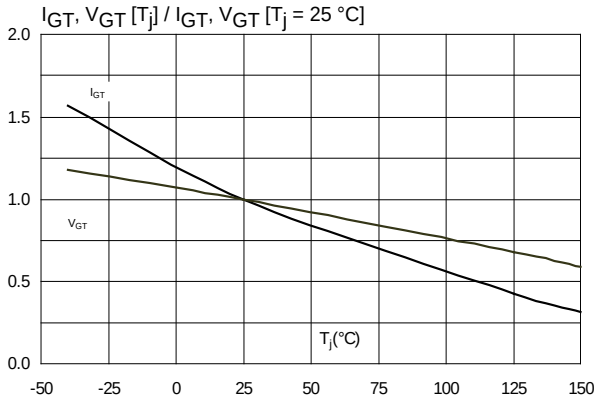


Figure 11: Relative variation of leakage current versus junction temperature for different values of blocking voltage

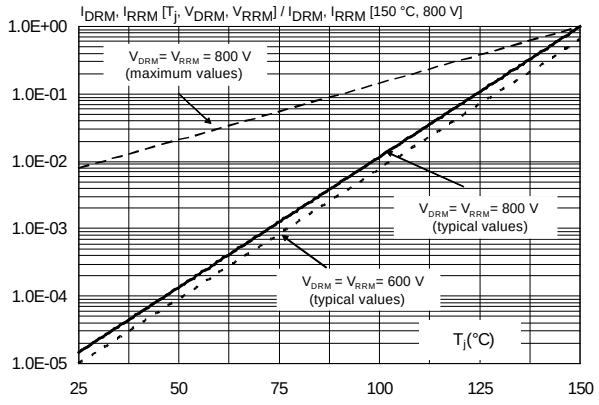
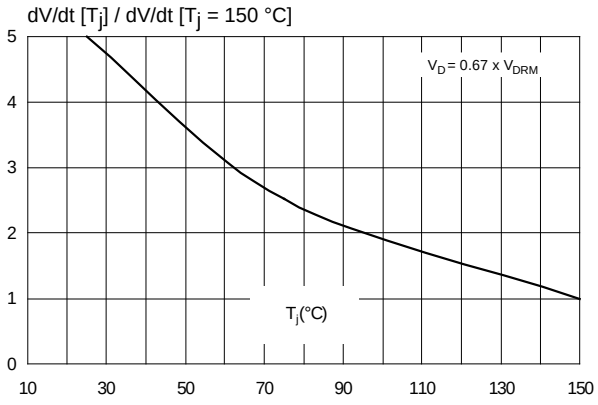


Figure 12: Relative variation of static dV/dt immunity versus junction temperature (typical values)



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.

- Epoxy meets UL 94,V0
- Lead-free package leads, halogen-free molding resin
- Pre-conditioning moisture sensitivity MSL 1

2.1 D³PAK package information

Figure 13: D³PAK package dimension definitions

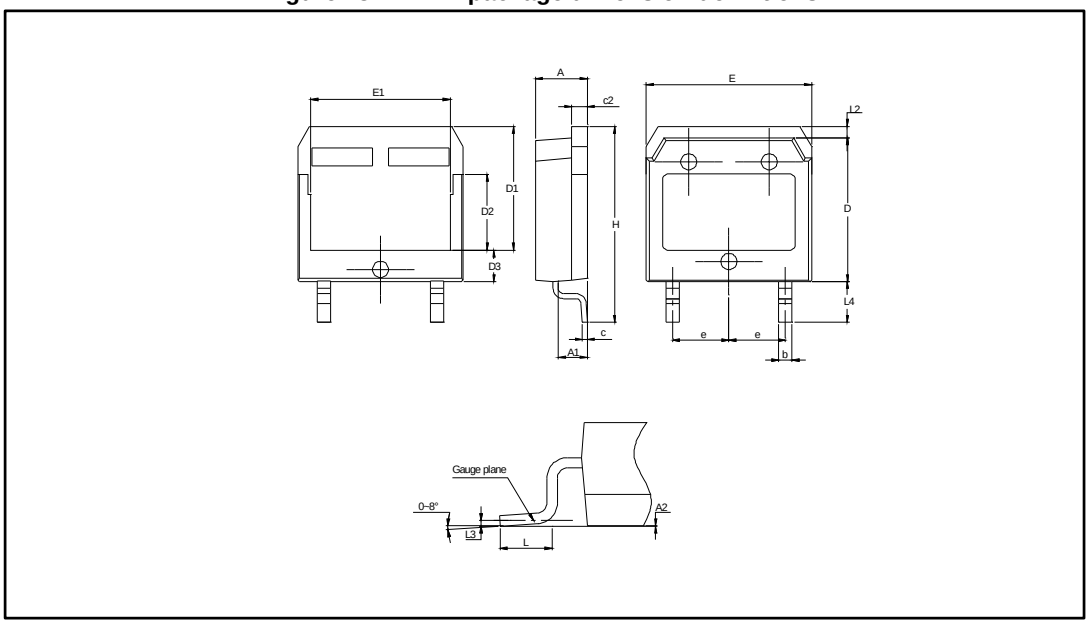


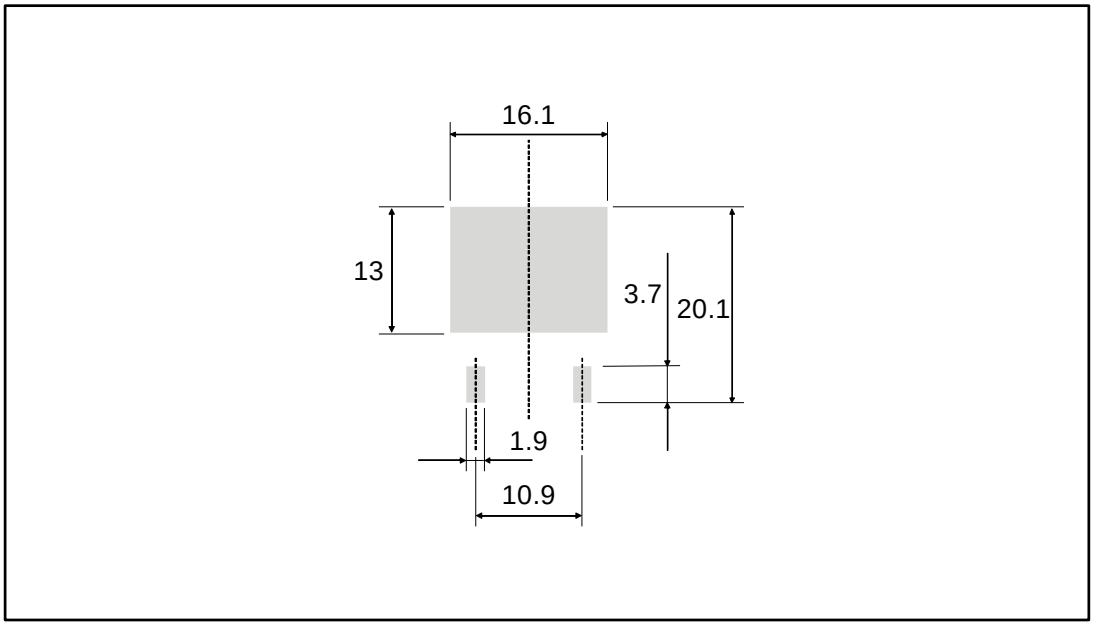
Table 5: D³PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[(1)]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90		5.10	0.1929		0.2008
A1	2.70		2.90	0.1063		0.1142
A2	0.02		0.25	0.0008		0.0098
b	1.15		1.45	0.0453		0.0571
c	0.40		0.65	0.0157		0.0256
c2	1.45		1.61	0.0571		0.0634
D	13.80		14.00	0.5433		0.5512
D1	11.80		12.10	0.4646		0.4764
D2	7.50		7.80	0.2953		0.3071
D3	2.90		3.20	0.1142		0.1260
E	15.85		16.05	0.6240		0.6319
E1	13.30		13.60	0.5236		0.5354
e		5.45			0.2146	
H	18.70		19.10	0.7362		0.7520
L	1.70		2.00	0.0669		0.0789
L2	1.00		1.15	0.0394		0.0453
L3		0.25			0.0098	
L4	3.80		4.10	0.1496		0.1614

Notes:

[(1)]Dimension in inches are given for reference only.

Figure 14: Minimum footprint (dimensions in mm)



3 Ordering information

Figure 15: Ordering information scheme

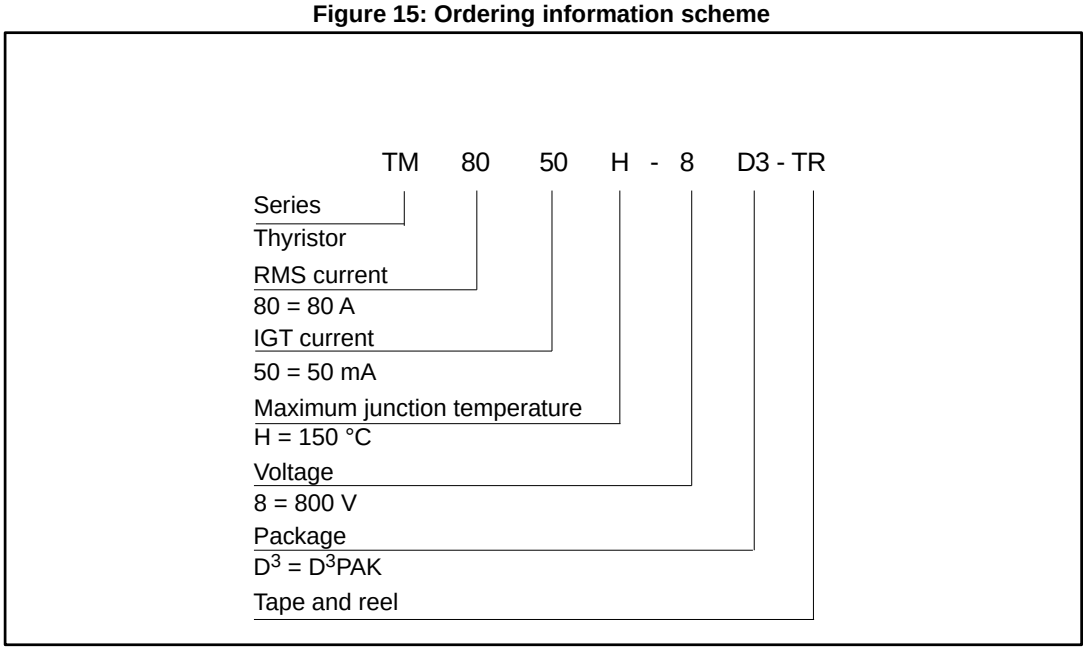


Table 6: Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
TM8050H-8D3-TR	TM8050H8	D^3PAK	4.2 g	400	Tape and reel

4 Revision history

Table 7: Document revision history

Date	Revision	Changes
11-Feb-2016	1	Initial release.
01-Apr-2016	2	Updated Table 3: "Electrical characteristics (T_j = 25 °C unless otherwise specified)".
29-Apr-2016	3	Updated *Table 4: "Thermal parameters"*.

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