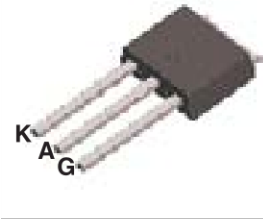
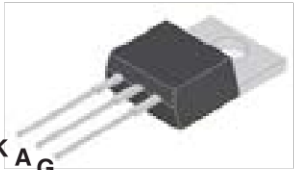
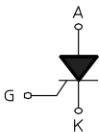


STANDARD & SENSITIVE 12A SCR

TO-252AA (DPAK) (FS12xxxD)  TO-263AB (D2PAK) (FS12xxxG)  (FULLY ISOLATED CASE) TO-220F (FS12xxxW)  TO-251AA (IPAK) (FS12xxxI)  TO-220AB (FS12xxxH)  		On-State Current 12 Amp Gate Trigger Current 200 μA to 25 mA Off-Satate Voltage 400 V ÷ 800 V FEATURES • Glass/passivated die junctions • Low current SCR • Low thermal resistance • High surge current capability • Low forward voltage drop • Solder dip 260 °C, 10s • Component in accordance to RoHS 2011/65/EU and WEEE 2002/96/EC • Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C  MECHANICAL DATA • Case: (DPAK)/ (D2PAK)/ (IPAK)/ (TO-220F)/ (TO-220AB). Epoxy meets UL 94V-0 flammability rating. • Polarity: As marked on the body. • Terminals: Matte tin plated leads, solderable per MIL-STD-750 Method 2026, J-STD-002 and JESD22-B102. Consumer grade, meets JESD 201 class 1A whisker test. TYPICAL APPLICATIONS The standard gate SCR FS1208, FS1209 and FS1210 series is suitable for a wide range of applications, e.g., Overvoltage Crowbar protection, Motor Control circuits in Power Tools and domestic appliances, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits. The sensitive gate SCR FS1202 series is suitable for applications where the available gate current is limited, e.g., Ground Fault Interruptors, Solid State Relays, Stand-by mode power supplies, smoke and alarm detectors.	
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Maximun Ratings and Electrical Characteristics at 25 °C

SYMBOL	PARAMETER	CONDITIONS	Value	Unit
$I_{T(RMS)}$	On-State Current	180 ° Conduction Angel (Note 1)	12	A
$I_{T(AV)}$	Average On-State Current	180 ° Conduction Angel (Note 1)	8	A
I_{TSM}	Non-repetitive On-State Current	Half Cycle, 60 Hz	145	A
I_{TSM}	Non-repetitive On-State Current	Half Cycle, 50 Hz	140	A
I^2t	Fusing Current	$t_p = 10$ ms, Half Cycle	98	A ² s
I_{GM}	Peak Gate Current	20 μ s max. (Note 1)	4	A
P_{GM}	Peak Gate Dissipation	20 μ s max. (Note 1)	10	W
$P_{G(AV)}$	Gate Dissipation	20 ms max.	0.1	W
T_j	Operating Temperature		(-40 to + 125)	°C
T_{stg}	Storage Temperature		(-40 to + 150)	°C
T_{sld}	Soldering Temperature	10s max.	260	°C
V_{RGM}	Max. Peak Reverse Gate Voltage (For FS1208, FS1209 and FS1210 only)		5	V
T_{iso}	R.M.S. isolation voltage 50/60 Hz si-nusoidal waveform		2500	Vac

Note 1: TO-220 $T_c = 70$ °C
DPAK/D2PAK/IPAK/TO-220AB $T_c = 105$ °C

STANDARD & SENSITIVE 12A SCR

SYMBOL	PARAMETER	Voltage			Unit
		D	M	N	
V_{DRM} V_{RRM}	Repetitive Peak Off State Voltage	400	600	800	V

Electrical Characteristics at Tamb = 25 °C

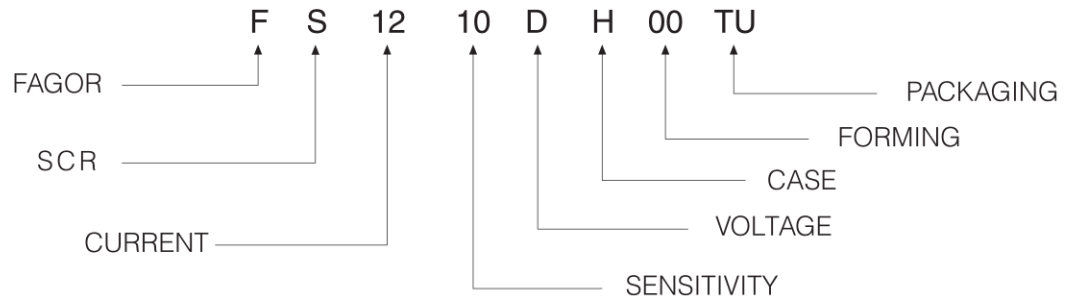
SYMBOL	PARAMETER	CONDITIONS			SG	STANDARD			Unit
					02	08	09	10	
I _{GT}	Gate Trigger Current	V _D = 12 V _{DC}	R _L = 140Ω	MAX	200	-	-	-	μA
			R _L = 33Ω	MIN	-	0.5	2	2	mA
				MAX	-	5	15	25	mA
V _{GT}	Gate Trigger Voltage	V _D = 12 V _{DC}	R _L = 140Ω R _L = 33Ω	MAX	0.8 -	- 1.3			V
V _{GD}	Gate Non Trigger Voltage	V _D =V _{DRM} , T _j = 125 °C, R _L = 3.3kΩ	R _{GK} = 220Ω Gate open	MIN	0.1 -	- 0.2			V
V _{RGM}	Reverse Gate Voltage	I _{R G} = 10μA,		MIN	8	-			V
I _H	Holding Current	I _T = 500 mA,	R _{GK} = 1kΩ Gate open	MAX	5 -	- 15	- 30	- 40	mA
I _L	Latching Current	I _G = 1.2 I _{GT}	R _{GK} = 1kΩ Gate open	MAX	6 -	- 30	- 60	- 60	mA
dV / dt	Critical Rate of Voltage Rise	V _D = 0.67 V _{DRM} , T _j = 125 °C	R _{GK} = 1kΩ Gate open	MIN	5 -	- 40	- 200	- 400	V/μs
dI / dt	Critical Rate of Current Rise	I _G = 2 x I _{GT} , tr ≤ 100 ns, f = 60 Hz, T _j = 125 °C			MIN	50			A/μs
V _{TM}	On-state Voltage	at I _T = 24 Amp, tp = 380 μs, T _j = 25 °C			MAX	1.6			V
V _{t (o)}	Threshold Voltage	T _j = 125 °C			MAX	0.85			V
r _d	Dynamic resistance	T _j = 125 °C			MAX	30			mΩ
I _{DRM} / I _{RRM}	Off-State Leakage Current	V _{DRM} = V _{RRM} , R _{GK} = 220Ω	T _j = 125 °C	MAX	1	2			mA
			T _j = 25 °C	MAX	5	5			μA

Thermal resistance

SYMBOL	PARAMETER	CONDITIONS		Value	Unit
$R_{th(j-c)}$	Thermal Resistance Junction-Case for DC		DPAK, IPAK, D2PAK, TO-220AB	1.3	$^\circ C/W$
			TO-220F	4.6	
$R_{th(j-a)}$	Thermal Resistance Junction-Amb for DC	$S = 0.5cm^2$	DPAK	70	$^\circ C/W$
		$S = 1cm^2$	D2PAK	45	
			IPAK	100	
			TO-220F	60	
			TO-220AB	60	

S = Copper surface under tab

Part Number Information



Ordering information

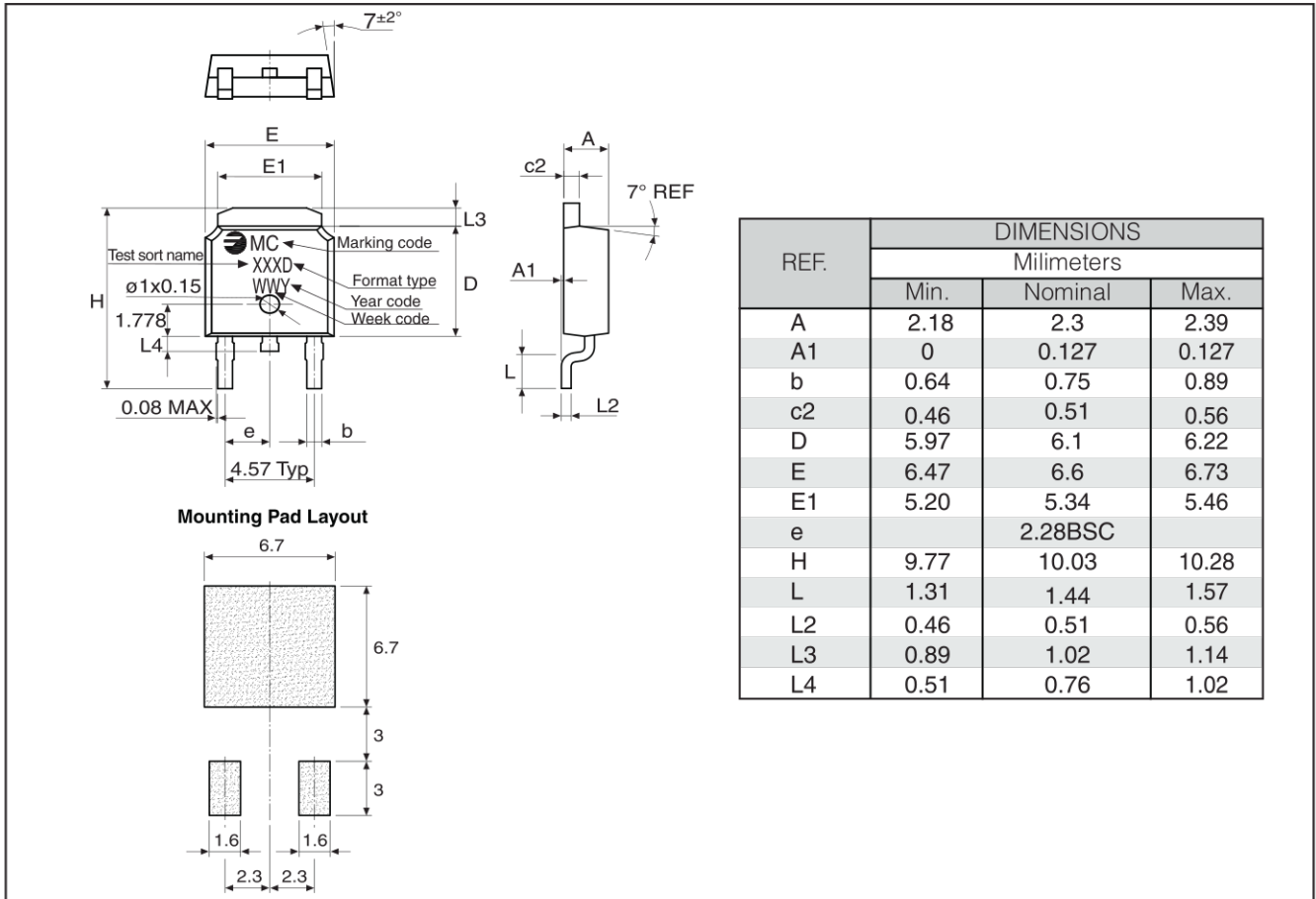
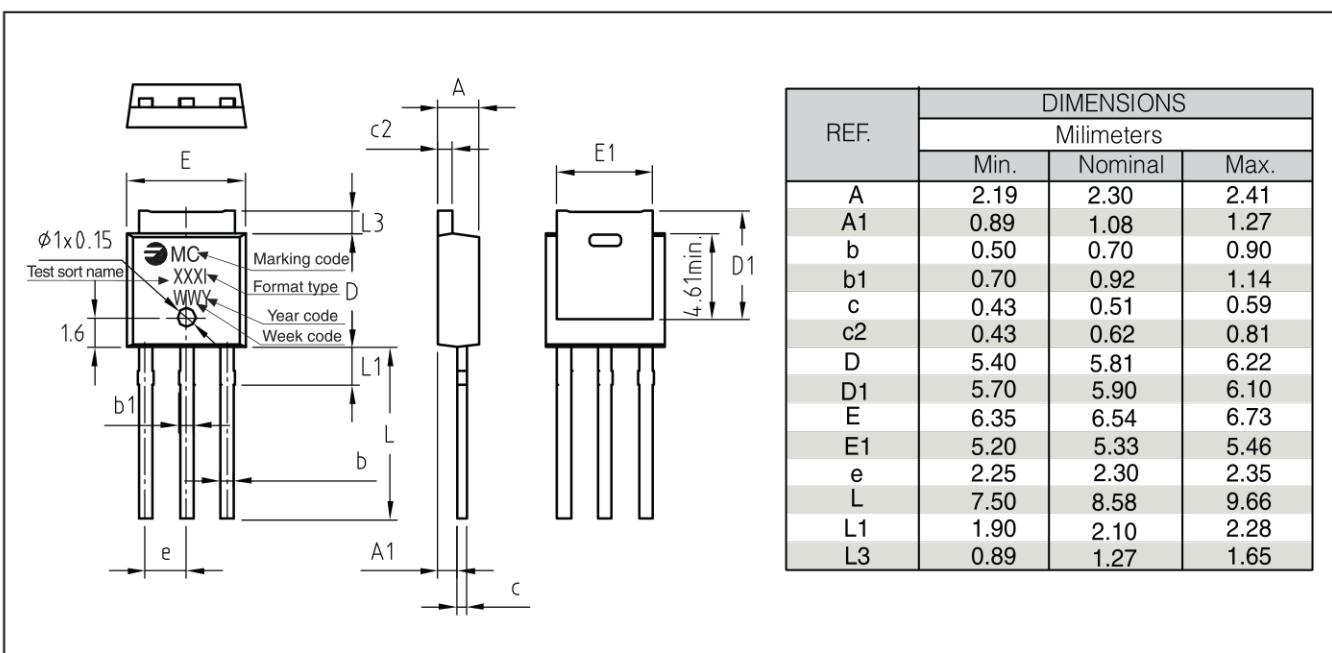
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DD 00TR	TR	13" diameter tape and reel	2500	0.30

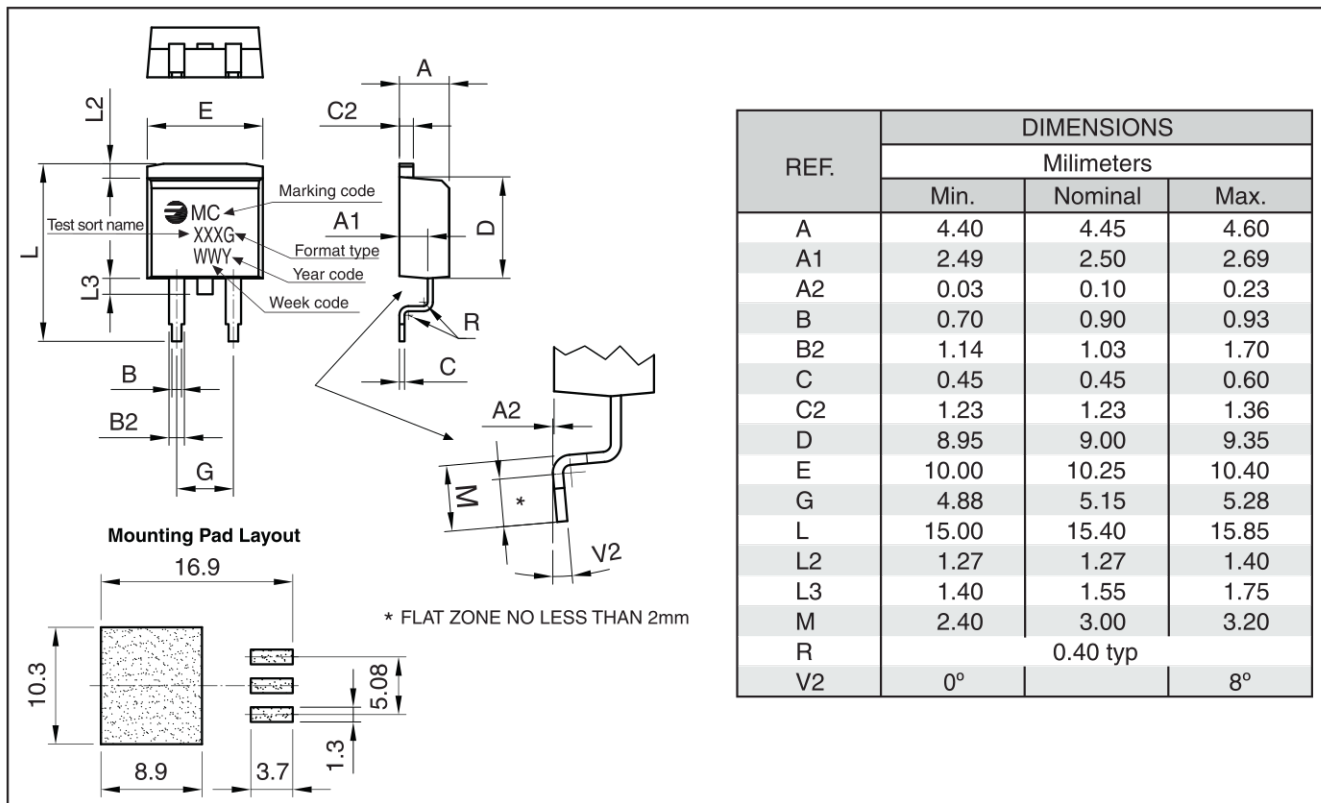
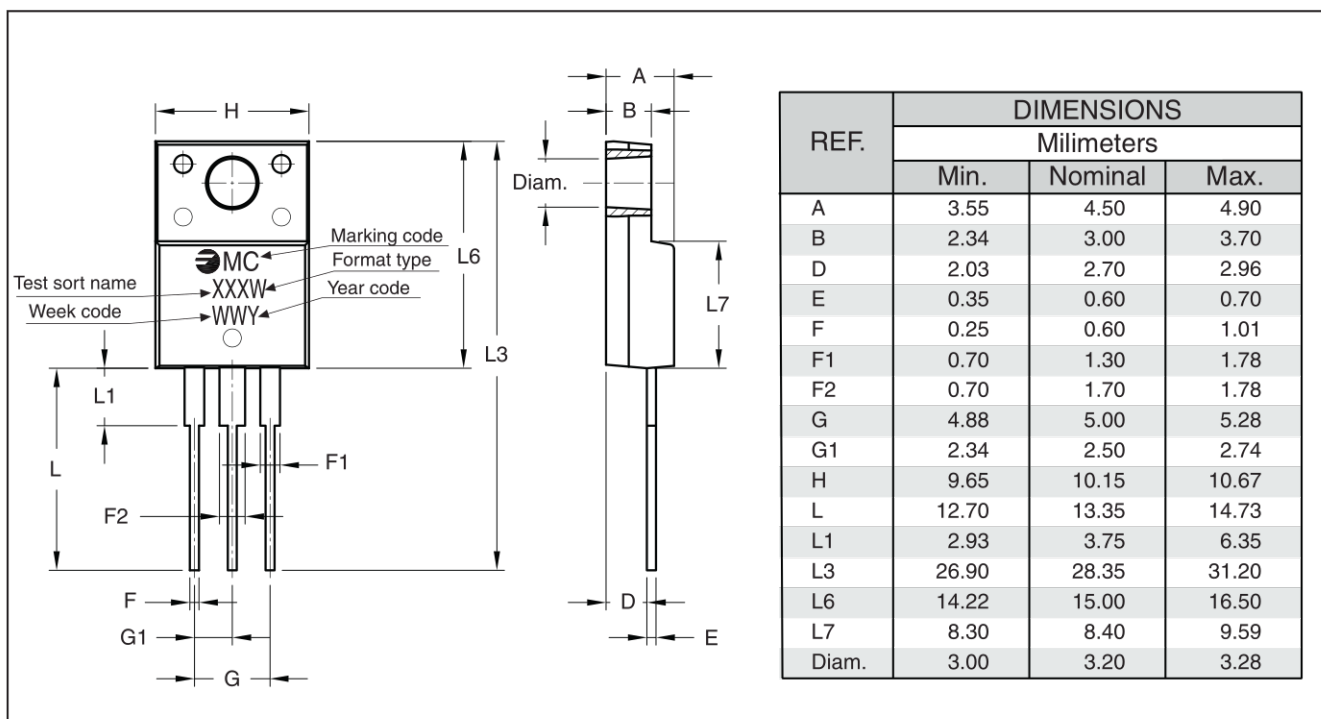
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FS1209DG 00TR	TR	13" diameter tape and reel	800	1.50

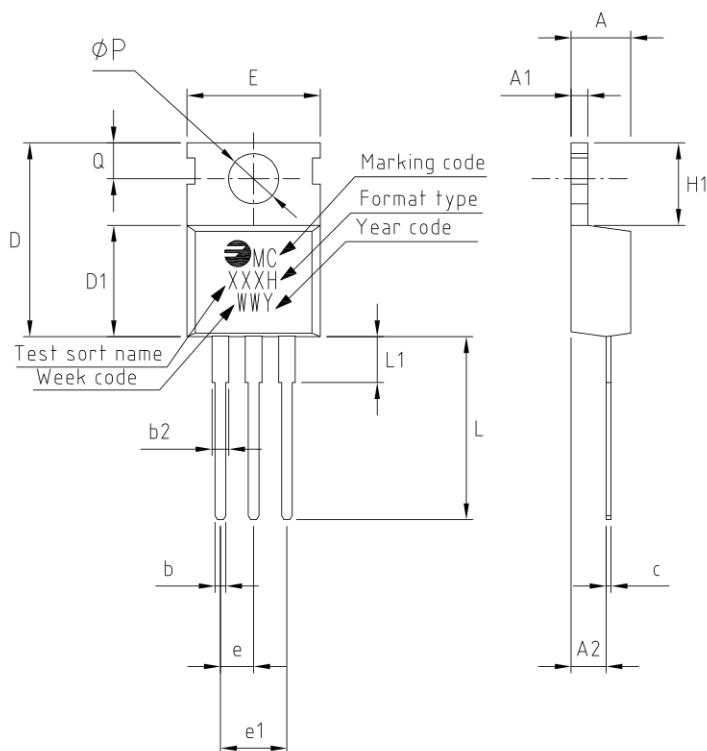
PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DW 00TU	TU	TUBE	1000	2.00

PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DI 00TU	TU	TUBE	4000	0.40

PREFERRED P/N	PACKAGE CODE	DELIVERY MODE	BASE QUANTITY	UNIT WEIGHT (g)
FS1209DH 00TU	TU	TUBE	1000	2.30

Package Outline Dimensions: (mm) TO-252AA (DPAK)

Package Outline Dimensions: (mm) TO-251AA (IPAK)


Package Outline Dimensions: (mm) TO-263AB (D2PAK)

Package Outline Dimensions: (mm) TO-220F


Package Outline Dimensions: (mm) TO-220AB


REF.	DIMENSIONS		
	Milimeters		
	Min.	Nominal	Max.
A	4.40	4.65	4.67
A1	1.17	1.27	1.37
A2	2.20	2.5	2.82
b	0.70	0.8	0.91
b2	1.14	1.42	1.70
c	0.31	0.46	0.60
D	14.65	14.72	16.80
D1	8.50	9.2	9.90
E	9.90	10.12	10.36
e	2.51	2.54	2.57
e1	4.98	5.08	5.18
H1	6.15	6.53	6.90
L	11.84	12.9	13.96
L1	3.19	3.58	3.96
P	3.450	3.69	3.935
Q	2.50	2.73	2.95

Ratings and Characteristics (Ta 25 °C unless otherwise noted)

Fig. 1: Maximum average power dissipation versus average on-state current.

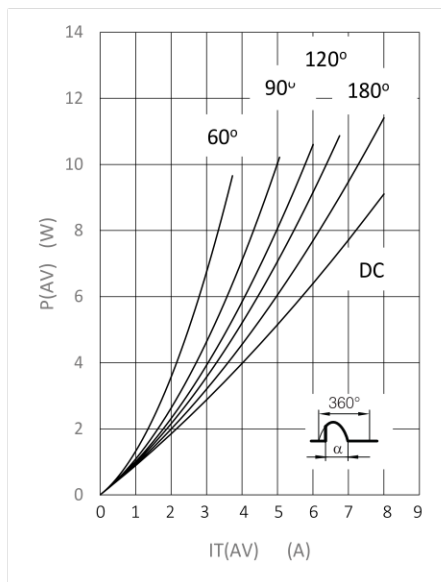


Fig. 2: Average and D.C. on-state current versus case temperature.

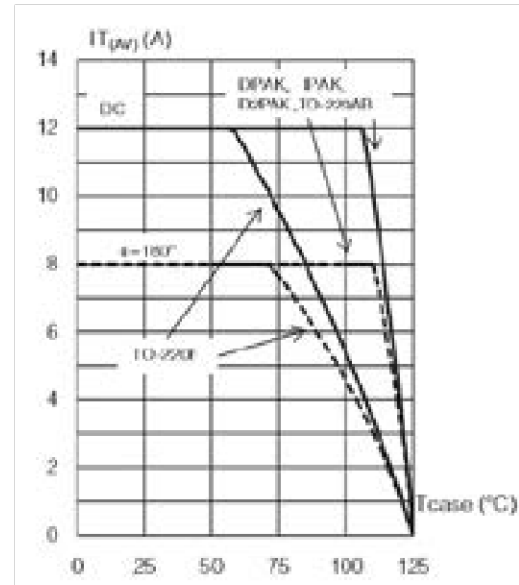


Fig. 3: Relative variation of thermal impedance junction to case versus pulse duration.

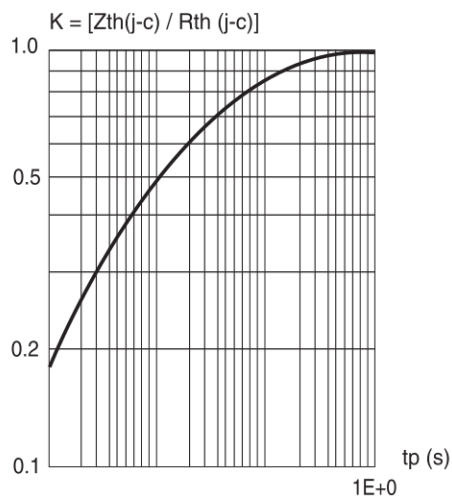
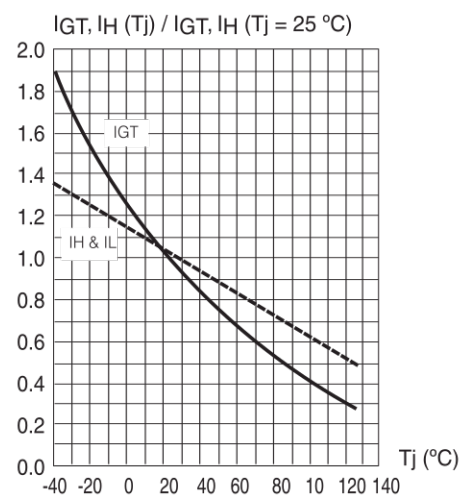


Fig. 4: Relative variation of gate trigger current, holding and latching current versus junction temperature for Sensitive Gate SCR (02).



Ratings and Characteristics (Ta 25 °C unless otherwise noted)

Fig. 5: Relative variation of gate trigger current, holding and latching current versus junction temperature for Standard Gate SCRs (08,09,10).

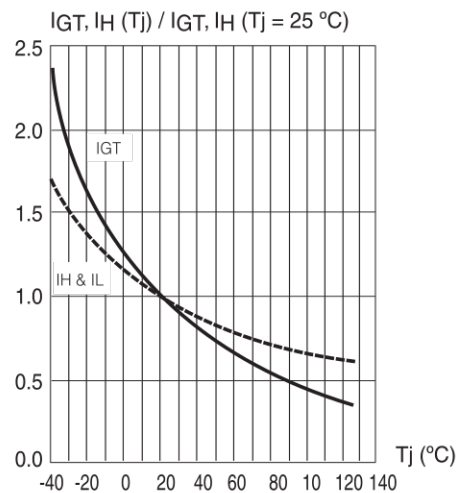


Fig. 6: Non repetitive surge peak on-state current versus number of cycles.

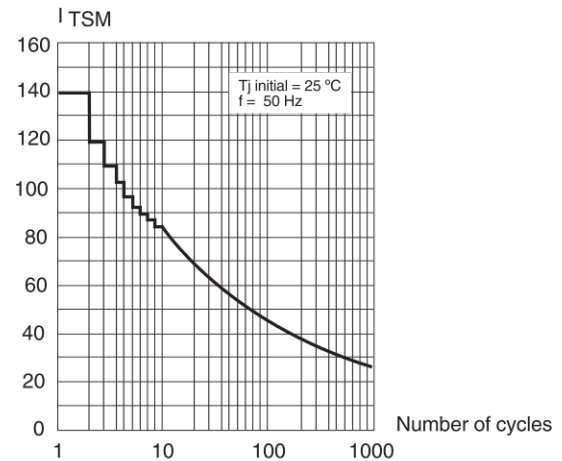


Fig. 7: Non repetitive surge peak on-state current for a sinusoidal pulse with width: $t_p < 10\text{ ms}$, and corresponding value of $I^2 t$.

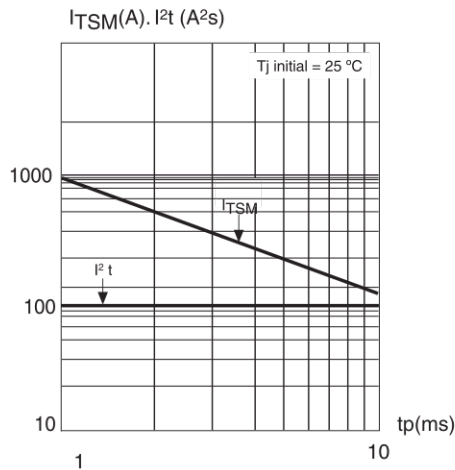
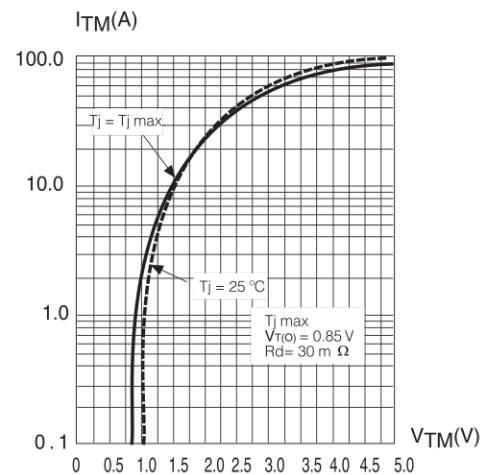


Fig. 8: On-state characteristics (maximum values).



Revision History

DATE	REVISION	DESCRIPTION OF CHANGES
14-Oct-2014	0	Original Data Sheet
16-Dec-2014	1	Modified Typical Applications Description and Title
07-Jun-2019	2	Updated figure 1
28-Mar-2022	3	Revised P.O.D. TO220AB

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