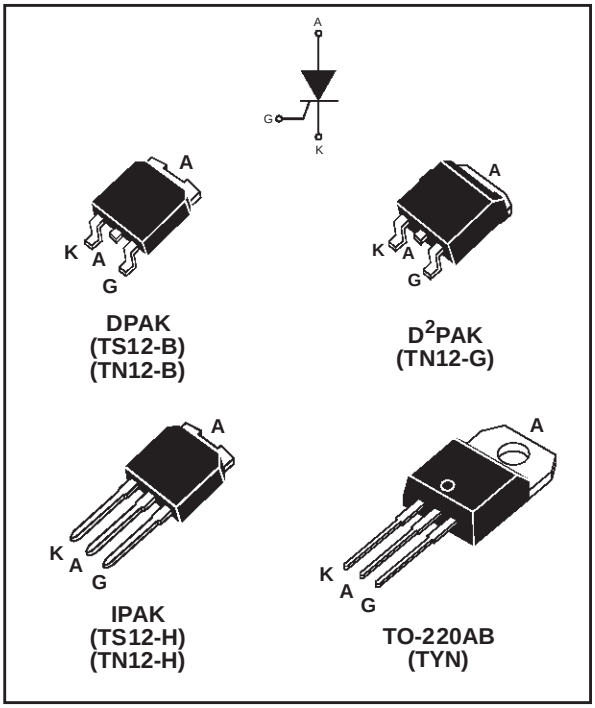
TN12, TS12 and TYNx12 Series

SENSITIVE & STANDARD

12A SCRs

MAIN FEATURES:

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600 to 1000	V
I_{GT}	0.2 to 15	mA



DESCRIPTION

Available either in sensitive (TS12) or standard (TYN, TN12...) gate triggering levels, the 12A SCR series is suitable to fit all modes of control found in applications such as overvoltage crowbar protection, motor control circuits in power tools and kitchen aids, in-rush current limiting circuits, capacitive discharge ignition, voltage regulation circuits...
Available in though-hole or surface-mount packages, they provide an optimized performance in a limited space area.

ABSOLUTE RATINGS (limiting values)

Symbol	Parameter			Value		Unit
$I_{T(RMS)}$	RMS on-state current (180° conduction angle)		Tc = 105°C	12		A
$IT_{(AV)}$	Average on-state current (180° conduction angle)		Tc = 105°C	8		A
				DPAK / IPAK	D PAK / TO-220AB	
I_{TSM}	Non repetitive surge peak on-state current	tp = 8.3 ms	Tj = 25°C	115	146	A
		tp = 10 ms		110	140	
I t	I t Value for fusing	tp = 10 ms	Tj = 25°C	60	98	A s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT} , tr ≤ 100 ns	F = 60 Hz	Tj = 125°C	50		A/µs
I_{GM}	Peak gate current	tp = 20 µs	Tj = 125°C	4		A
$P_{G(AV)}$	Average gate power dissipation		Tj = 125°C	1		W
T_{stg} Tj	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125		°C
V_{RGM}	Maximum peak reverse gate voltage (for TN12 & TYN)			5		V

ELECTRICAL CHARACTERISTICS (Tj = 25°C, unless otherwise specified)

■ **SENSITIVE**

Symbol	Test Conditions			TS1220	Unit
I_{GT}	V_D = 12 V R_L = 140 Ω		MAX.	200	µA
V_{GT}			MAX.	0.8	V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ R_{GK} = 1 kΩ	Tj = 125°C	MIN.	0.1	V
V_{RG}	I_{RG} = 10 µA		MIN.	8	V
I_H	I_T = 50 mA R_{GK} = 1 kΩ		MAX.	5	mA
I_L	I_G = 1 mA R_{GK} = 1 kΩ		MAX.	6	mA
dV/dt	V_D = 67 % V_{DRM} R_{GK} = 220 Ω	Tj = 125°C	MIN.	5	V/µs
V_{TM}	I_{TM} = 24 A tp = 380 µs	Tj = 25°C	MAX.	1.6	V
V_{t0}	Threshold voltage	Tj = 125°C	MAX.	0.85	V
R_d	Dynamic resistance	Tj = 125°C	MAX.	30	mΩ
I_{DRM}	$V_{DRM} = V_{RRM}$ R_{GK} = 220 Ω	Tj = 25°C	MAX.	5	µA
I_{RRM}		Tj = 125°C		2	mA

■ **STANDARD**

Symbol	Test Conditions			TN1215		TYN		Unit
				B/H	G	x12T	x12	
I_{GT}	V_D = 12 V R_L = 33 Ω		MIN.	2		0.5	2	mA
			MAX.	15		5	15	
V_{GT}			MAX.	1.3				V
V_{GD}	$V_D = V_{DRM}$ R_L = 3.3 kΩ	Tj = 125°C	MIN.	0.2				V
I_H	I_T = 500 mA Gate open		MAX.	40	30	15	30	mA
I_L	I_G = 1.2 I_{GT}		MAX.	80	60	30	60	mA
dV/dt	V_D = 67 % V_{DRM} Gate open	Tj = 125°C	MIN.	200		40	200	V/µs
V_{TM}	I_{TM} = 24 A tp = 380 µs	Tj = 25°C	MAX.	1.6				V
V_{t0}	Threshold voltage	Tj = 125°C	MAX.	0.85				V
R_d	Dynamic resistance	Tj = 125°C	MAX.	30				mΩ
I_{DRM}	$V_{DRM} = V_{RRM}$	Tj = 25°C	MAX.	5				µA
I_{RRM}		Tj = 125°C		2				mA

THERMAL RESISTANCES

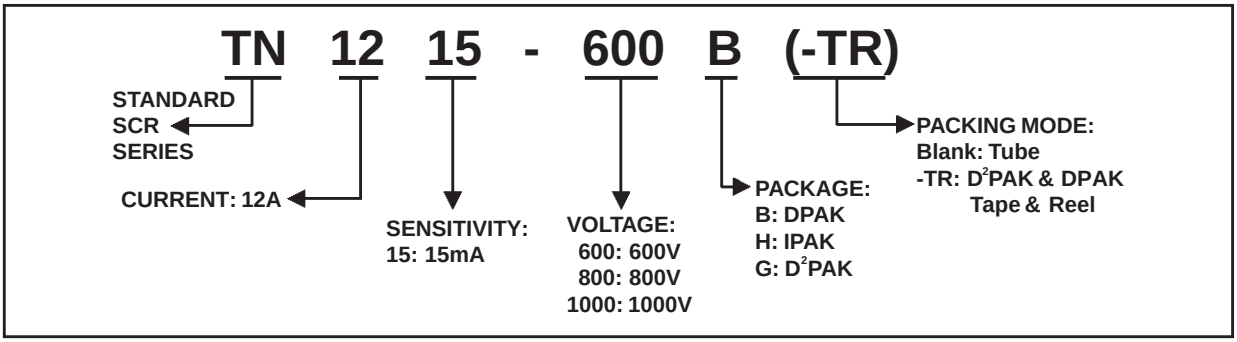
Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)			1.3	°C/W
$R_{th(j-a)}$	Junction to ambient		TO-220AB	60	°C/W
			IPAK	100	
		S = 1 cm	D PAK	45	
		S = 0.5 cm	DPAK	70	

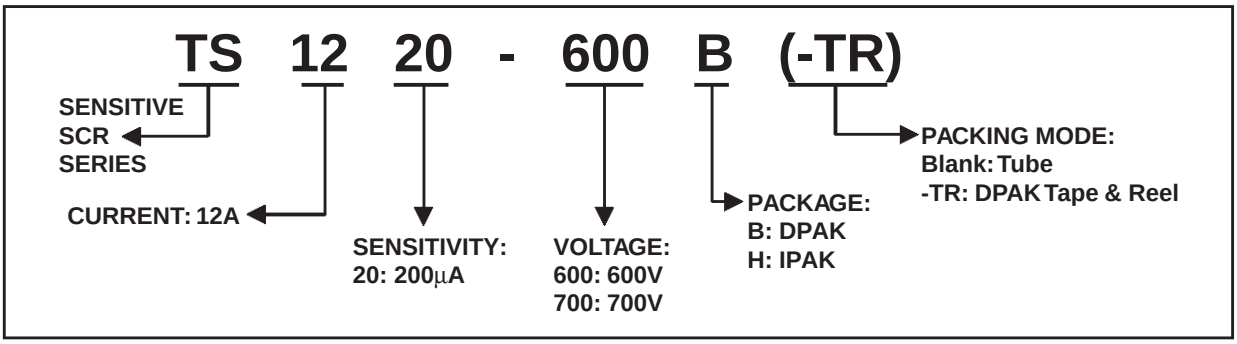
S = Copper surface under tab

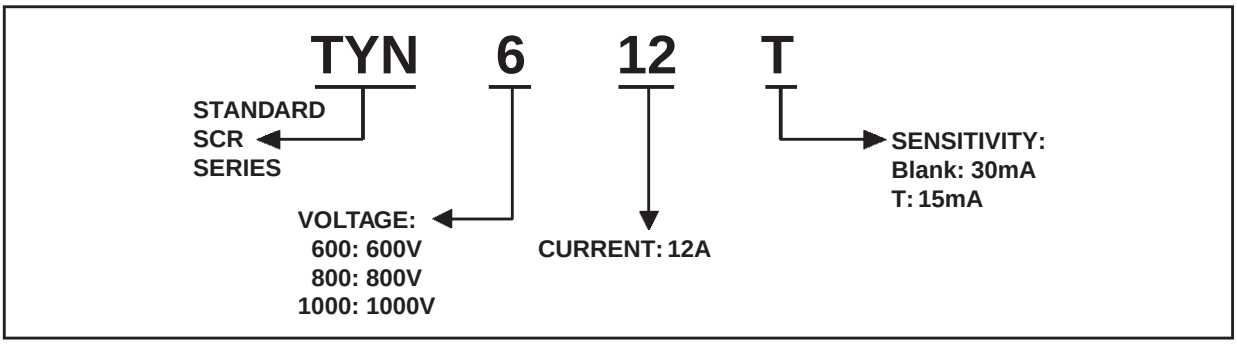
PRODUCT SELECTOR

Part Number	Voltage (xxx)				Sensitivity	Package
	600 V	700 V	800 V	1000 V		
TN1215-xxxB	X		X		15 mA	DPAK
TN1215-xxxG	X		X	X	15 mA	D PAK
TN1215-xxxH	X		X		15 mA	IPAK
TS1220-xxxB	X	X			0.2 mA	DPAK
TS1220-xxxH	X	X			0.2 mA	IPAK
TYNx12	X		X	X	30 mA	TO-220AB
TYNx12T	X		X	X	15 mA	TO-220AB

ORDERING INFORMATION







OTHER INFORMATION

Part Number	Marking	Weight	Base Quantity	Packing mode
TN1215-x00B	TS1215x00	0.3 g	75	Tube
TN1215-x00B-TR	TS1215x00	0.3 g	2500	Tape & reel
TN1215-x00G	TS1215x00G	1.5 g	50	Tube
TN1215-x00G-TR	TS1215x00G	1.5 g	1000	Tape & reel
TN1215-x00H	TN1215x00	0.4 g	75	Tube
TS1220-x00B	TS1220x00	0.3 g	75	Tube
TS1220-x00B-TR	TS1220x00	0.3 g	2500	Tape & reel
TS1220-x00H	TS1220x00	0.4 g	75	Tube
TYNx12	TYNx12	2.3 g	250	Bulk
TYNx12RG	TYNx12	2.3 g	50	Tube
TYNx12T	TYNx12T	2.3 g	250	Bulk
TYNx12TRG	TYNx12T	2.3 g	50	Tube

Note: x = voltage

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

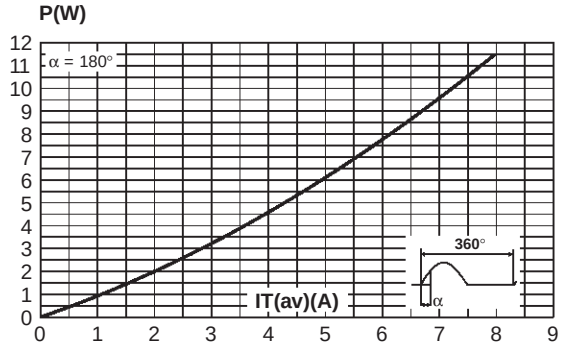


Fig. 2-1: Average and D.C. on-state current versus case temperature.

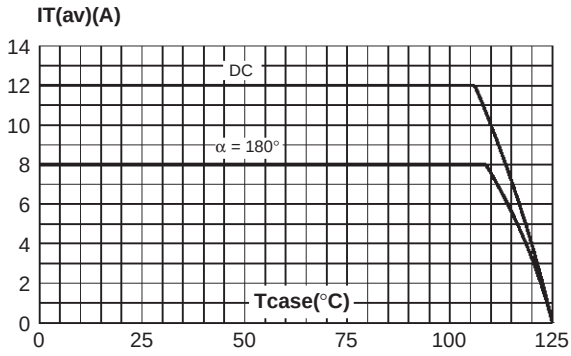


Fig. 2-2: Average and D.C. on-state current versus ambient temperature (device mounted on FR4 with recommended pad layout) (DPAK and D^2PAK).

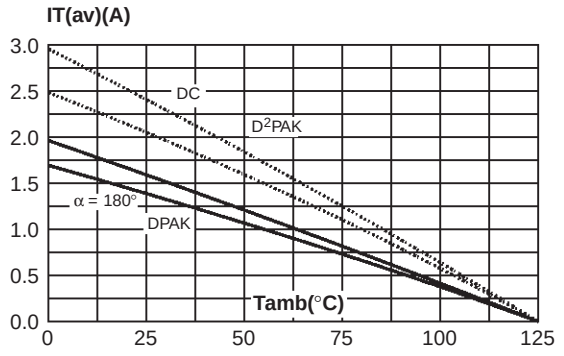


Fig. 3-1: Relative variation of thermal impedance junction to case versus pulse duration.

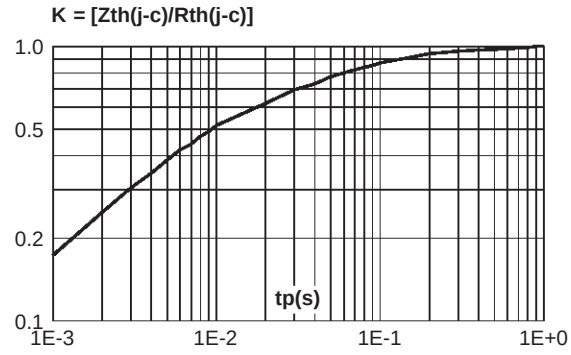


Fig. 3-2: Relative variation of thermal impedance junction to ambient versus pulse duration (recommended pad layout, FR4 PC board).

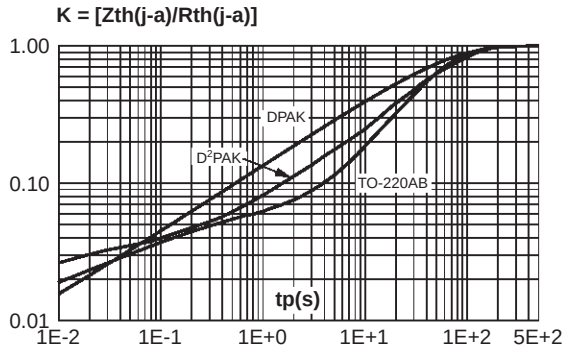


Fig. 4-1: Relative variation of gate trigger current, holding current and latching versus junction temperature for TS12 series.

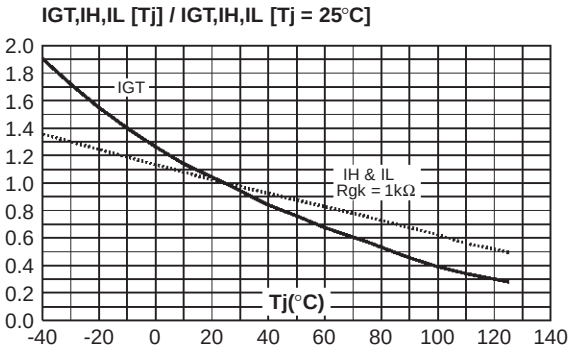


Fig. 4-2: Relative variation of gate trigger current, holding current and latching current versus junction temperature for TN12 & TYN series.

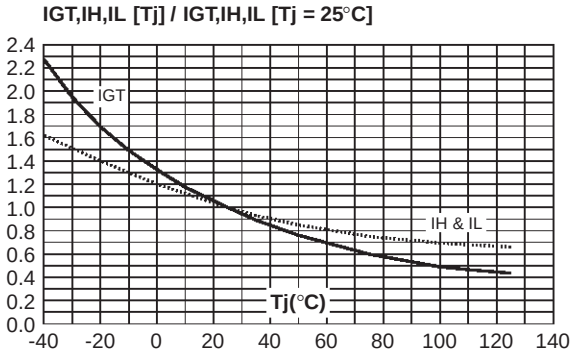


Fig. 5: Relative variation of holding current versus gate-cathode resistance (typical values) for TS12 series.

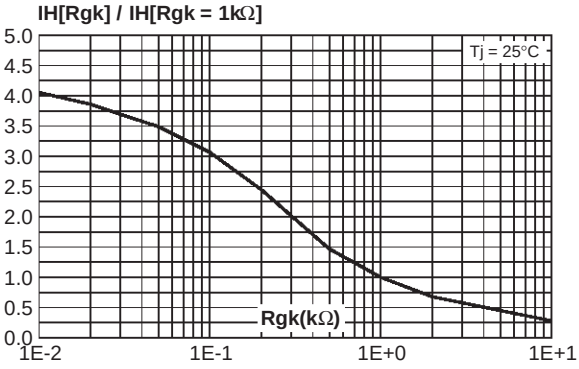


Fig. 6: Relative variation of dV/dt immunity versus gate-cathode resistance (typical values) for TS12 series.

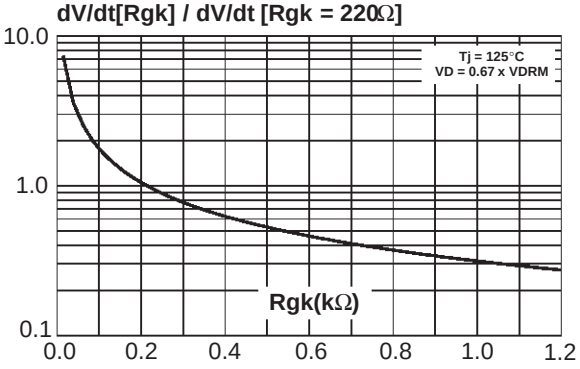


Fig. 7: Relative variation of dV/dt immunity versus gate-cathode capacitance (typical values) for TS12 series.

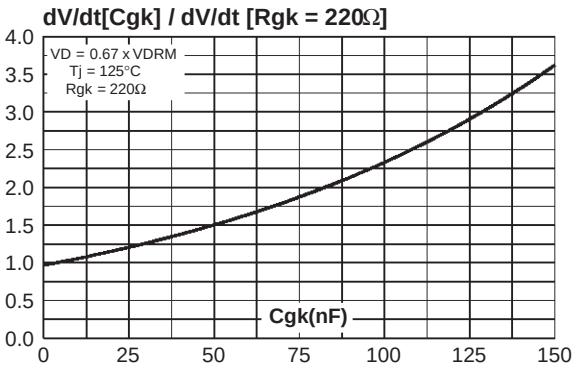


Fig. 8: Surge peak on-state current versus number of cycles (TS12/TN12/TYN).

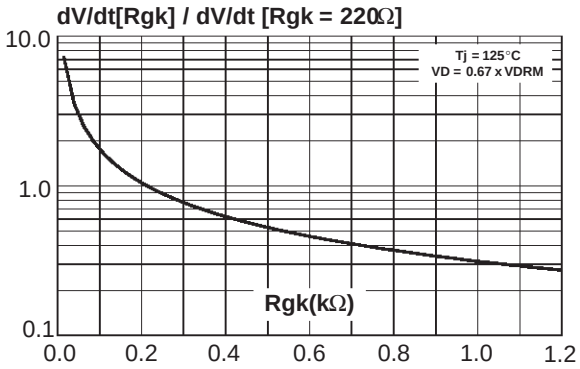


Fig. 9: Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp < 10 ms, and corresponding values of I t.

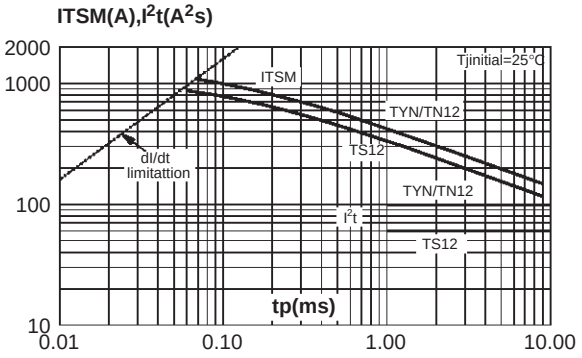


Fig. 10: On-state characteristics (maximum values).

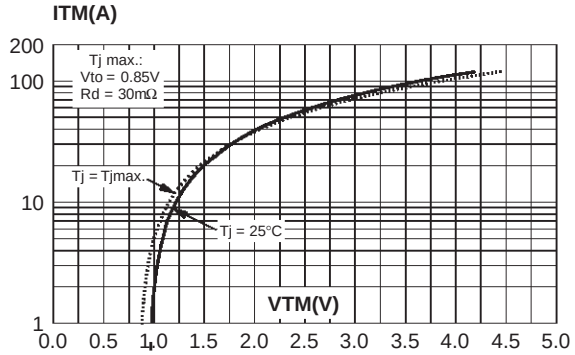
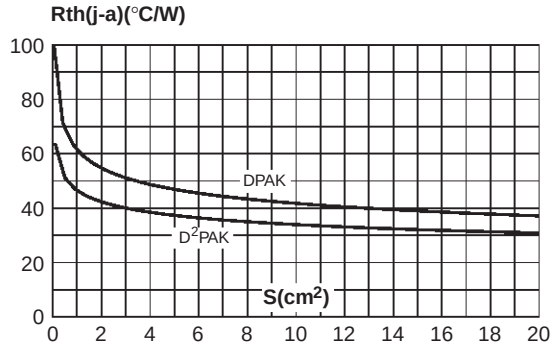
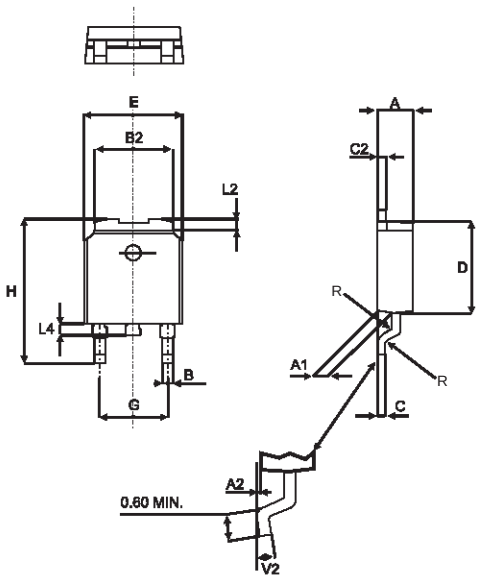


Fig. 11: Thermal resistance junction to ambient versus copper surface under tab (Epoxy printed circuit board FR4, copper thickness: 35 µm) .



PACKAGE MECHANICAL DATA

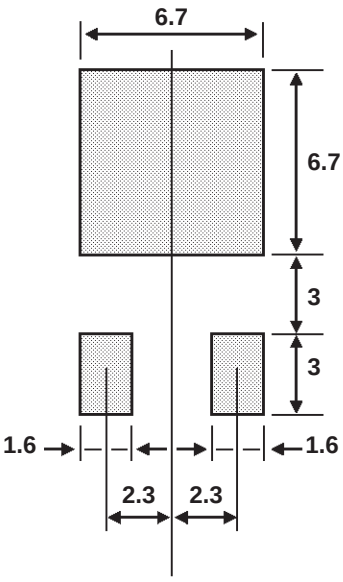
DPAK (Plastic)



REF.	DIMENSIONS			
	Millimeters		Inches	
	Min.	Max	Min.	Max.
A	2.20	2.40	0.086	0.094
A1	0.90	1.10	0.035	0.043
A2	0.03	0.23	0.001	0.009
B	0.64	0.90	0.025	0.035
B2	5.20	5.40	0.204	0.212
C	0.45	0.60	0.017	0.023
C2	0.48	0.60	0.018	0.023
D	6.00	6.20	0.236	0.244
E	6.40	6.60	0.251	0.259
G	4.40	4.60	0.173	0.181
H	9.35	10.10	0.368	0.397
L2	0.80 typ.		0.031 typ.	
L4	0.60	1.00	0.023	0.039
R	0.2 typ.		0.007 typ.	
V2	0°	8°	0°	8°

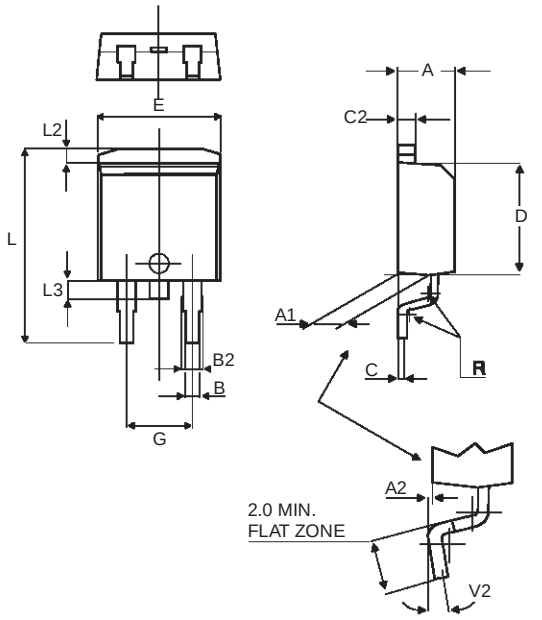
FOOTPRINT DIMENSIONS (in millimeters)

DPAK (Plastic)



PACKAGE MECHANICAL DATA

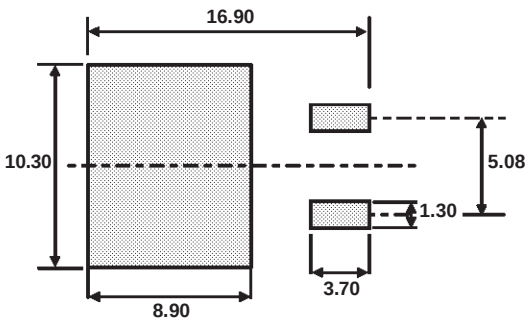
D^2PAK (Plastic)



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.169		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.70		0.93	0.027		0.037
B2	1.25	1.40		0.048	0.055	
C	0.45		0.60	0.017		0.024
C2	1.21		1.36	0.047		0.054
D	8.95		9.35	0.352		0.368
E	10.00		10.28	0.393		0.405
G	4.88		5.28	0.192		0.208
L	15.00		15.85	0.590		0.624
L2	1.27		1.40	0.050		0.055
L3	1.40		1.75	0.055		0.069
R		0.40			0.016	
V2	0°		8°	0°		8°

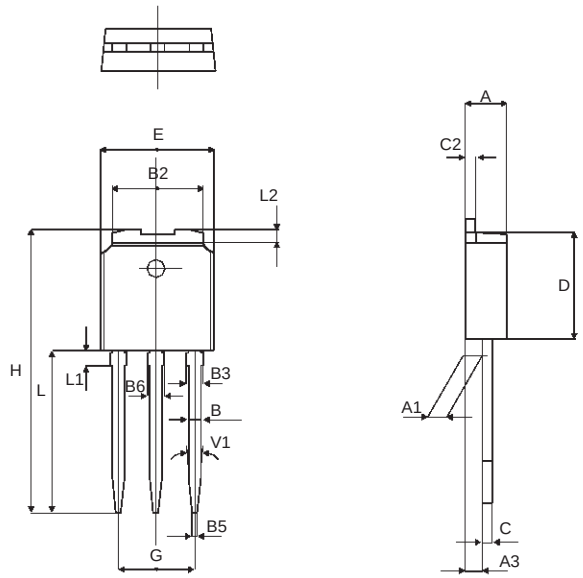
FOOTPRINT DIMENSIONS (in millimeters)

D^2PAK (Plastic)



PACKAGE MECHANICAL DATA

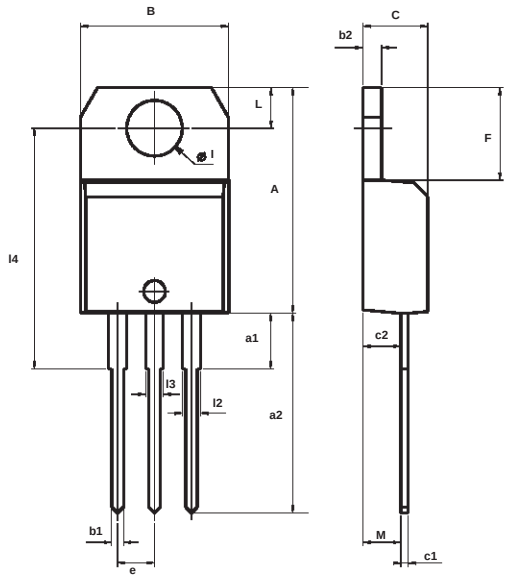
IPAK (Plastic)



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.035	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039
V1		10°			10°	

PACKAGE MECHANICAL DATA

TO-220AB (Plastic)



REF.	DIMENSIONS					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	2.40		2.70	0.094		0.106
F	6.20		6.60	0.244		0.259
I	3.75		3.85	0.147		0.151
I4	15.80	16.40	16.80	0.622	0.646	0.661
L	2.65		2.95	0.104		0.116
I2	1.14		1.70	0.044		0.066
I3	1.14		1.70	0.044		0.066
M		2.60			0.102	