TN1215, TYN612, TYN812, TYN1012

Standard 12 A SCRs

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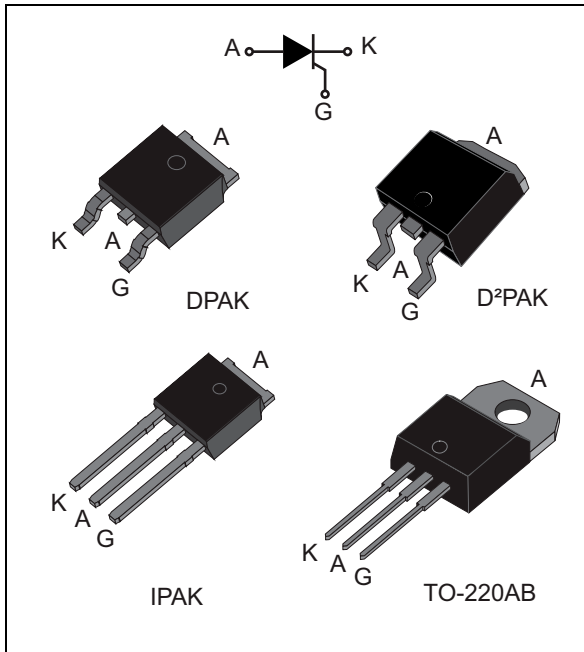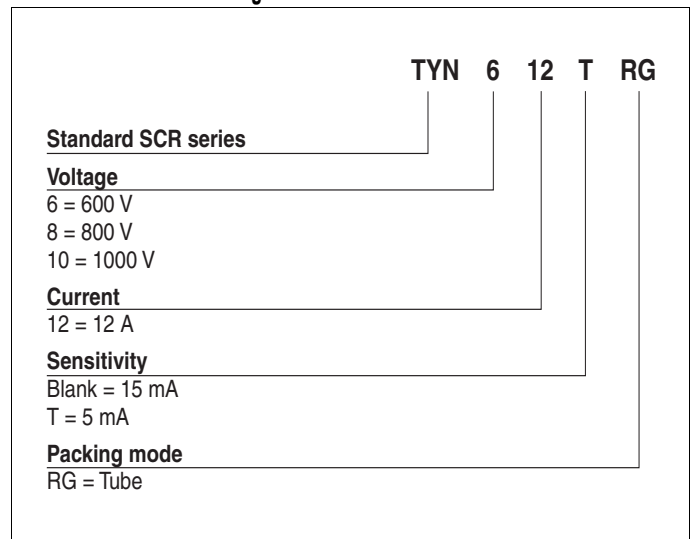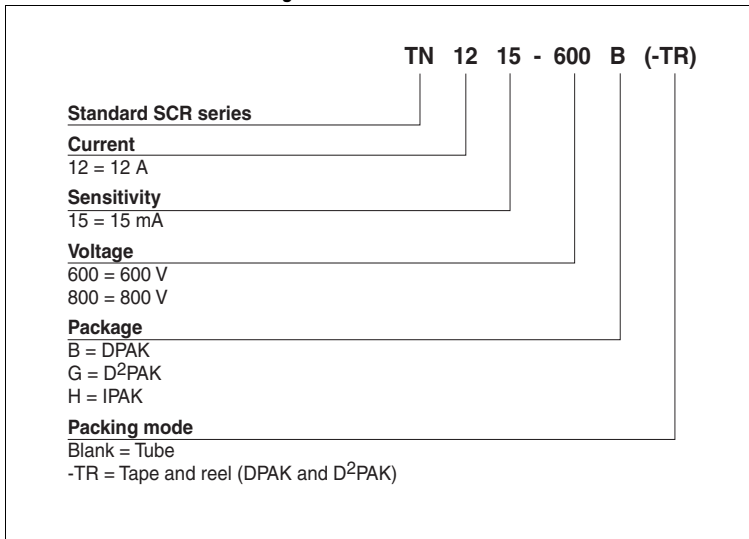## Features

- On-state RMS current, $I_{T(RMS)}$ 12 A
- Repetitive peak off-state voltage, V_{DRM} and V_{RRM} 600 V, 800 V and 1000 V
- Triggering gate current, I_{GT} 5 mA or 15 mA

Description

The standard 12 A 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, inrush current limiting circuits, capacitive discharge ignition and voltage regulation circuits.

Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space.

Figure 1. TN1215 series

```
              TN  12  15 - 600  B  (-TR)

Standard SCR series
Current
12 = 12 A
Sensitivity
15 = 15 mA
Voltage
600 = 600 V
800 = 800 V
Package
B = DPAK
G = D2PAK
H = IPAK
Packing mode
Blank = Tube
-TR = Tape and reel (DPAK and D2PAK)
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Figure 2. TYNx12 series

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                      TYN  6  12  T  RG

Standard SCR series
Voltage
6 = 600 V
8 = 800 V
10 = 1000 V
Current
12 = 12 A
Sensitivity
Blank = 15 mA
T = 5 mA
Packing mode
RG = Tube
```

1   Characteristics

Table 1. Absolute ratings (limiting values)

Symbol	Parameter			Value		Unit
				TN1215-x00B **TN1215-x00H** [1] [2]	**TN1215-x00G**[1][2] **TYNx12**[2][3] **TYNx12T**[2][3]	
$I_{T(RMS)}$	On-state RMS current (180° conduction angle)	TO-220AB ins. D^2PAK	T_c = 110 °C	12		A
$I_{T(AV)}$	Average on-state current (180° conduction angle)	DPAK IPAK		8		
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	$T_{jinitial}$ = 25 °C	115	145	A
		t_p = 10 ms		110	140	
I^2t	I^2t value for fusing		$T_{jinitial}$ = 25 °C	60	98	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
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4		A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1		W
T_{stg} T_j	Storage junction temperature range Operating junction temperature range			- 40 to + 150 - 40 to + 125		°C
V_{RGM}	Maximum peak reverse gate voltage			5		V

1. x00= 600, 800

2. Check *Table 1* for devices availability

3. x= 6,8,10

Table 2. Standard electrical characteristics (T_j = 25 °C, unless otherwise specified)

Symbol	Test conditions			TN1215-x00[1][2]		TYN[2]		Unit
				-B/-H	-G	x12T[3]	x12[3]	
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	T_j = 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	T_j =125 °C	Min.	200		40	200	V/μs
V_{TM}	I_{TM} = 24 A t_p = 380 μs	T_j = 25 °C	Max.	1.6				V
V_{to}	Threshold voltage	T_j = 125 °C	Max.	0.85				V
R_d	Dynamic resistance	T_j = 125 °C	Max.	30				mΩ
I_{DRM}	V_D = V_R = V_{DRM} = V_{RRM}	T_j = 25 °C	Max.	5				μA
I_{RRM}		T_j = 125 °C		2				mA

1. x00= 600, 800

2. Check *Table 1* for devices availability

3. x= 6,8,10

Table 3. Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case (DC)	D^2PAK, DPAK, IPAK, TO-220AB		1.3	°C/W
$R_{th(j-a)}$	Junction to ambient (DC)	$S^{(1)}$ = 0.5 cm^2	DPAK	70	°C/W
		$S^{(1)}$ = 1.0 cm^2	D²PAK	45	
			IPAK	100	
			TO-220AB	60	

1. S = Copper surface under tab

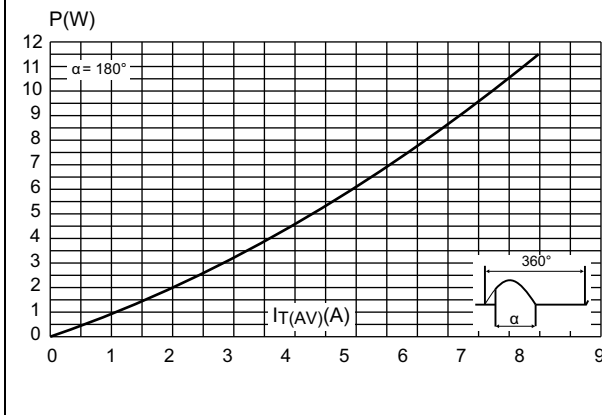**Figure3. Maximum average power dissipation versus average on-state current**

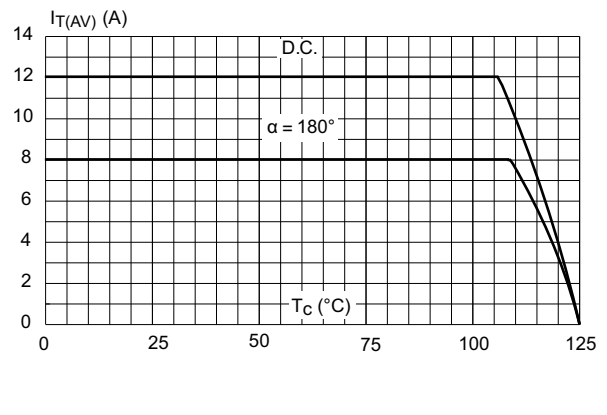**Figure 4. Average and DC on-state current versus case temperature**

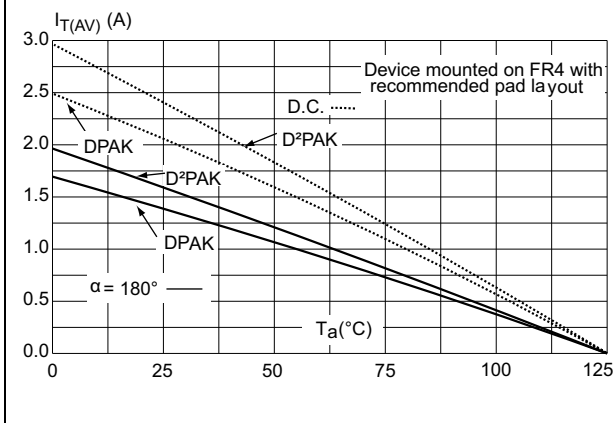**Figure 5 Average and DC on-state current versus ambient temperature (DPAK, D^{2}PAK)**

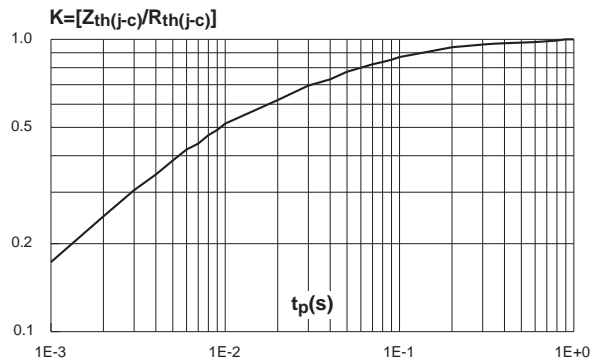**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**

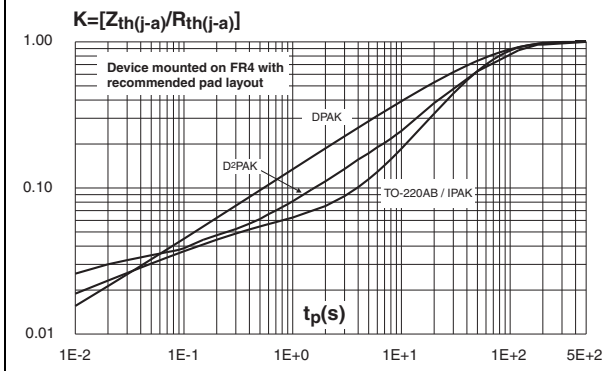**Figure 7. Relative variation of thermal impedance junction to ambient versus pulse duration**

Figure8. Relative variation of gate trigger, latching and holding current versus junction temperature
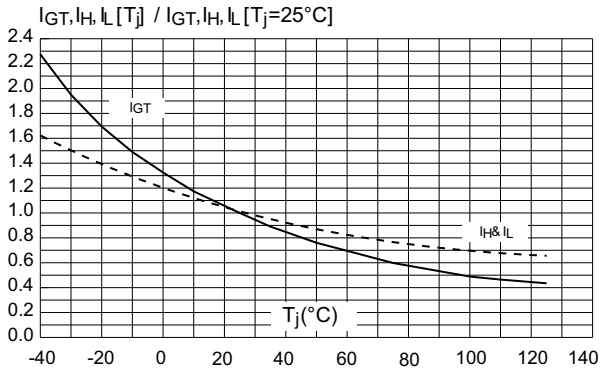
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Figure 9. Surge peak on-state current versus number of cycles

$I_{TSM}(A)$

D²PAK, TO-220AB

t_p=10ms

One cycle

Non repetitive
Tj initial=25°C

DPAK
IPAK

Repetitive
T_C=110°C

Number of cycles
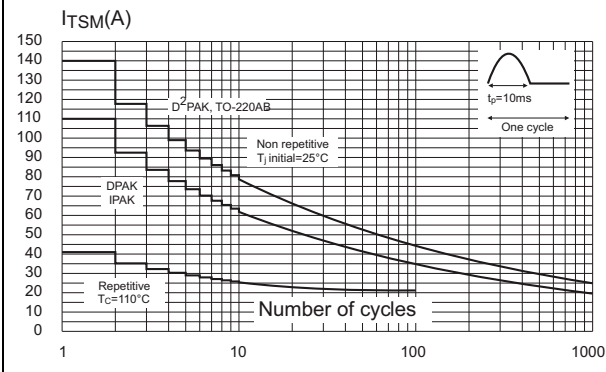
Figure 10. Non repetitive surge peak on-state current for a sinusoidal pulse with width tp<10 ms

$I_{TSM}(A)$

Tj initial = 25 °C
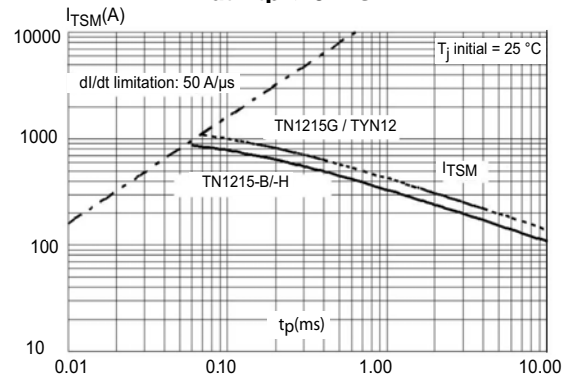
dI/dt limitation: 50 A/μs

TN1215G / TYN12

TN1215-B/-H

I_{TSM}

t_p(ms)

Figure11. On-state characteristics (maximum values)

$I_{TM}(A)$

Tj max.:
V_{t0}=0.85V
R_d=30mΩ

Tj=max

Tj=25°C

$V_{TM}(V)$
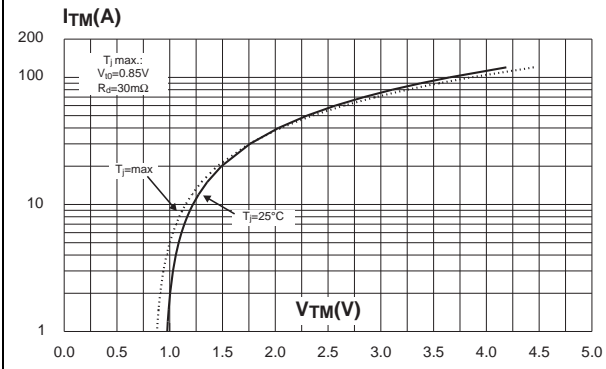
Figure 12. Thermal resistance junction to ambient versus copper surface under tab (DPAK and D²PAK)

$R_{th(j-a)}$(°C/W)

Epoxy printed circuit board FR4
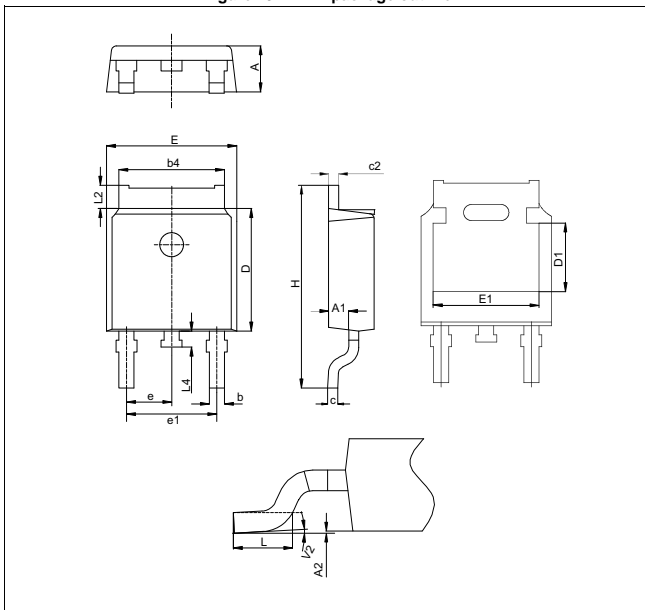copper thickness = 35 μm

DPAK

D²PAK

$S(cm^2)$
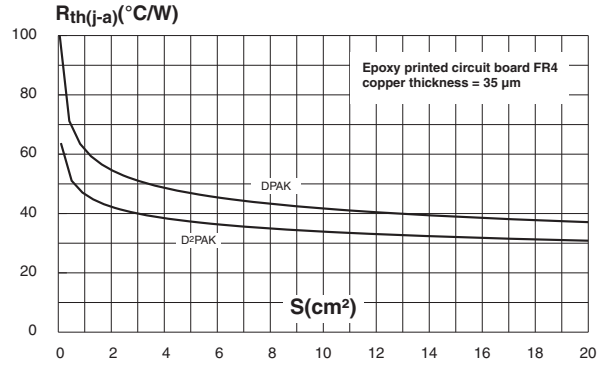
2 Package information

- Halogen free molding resin
- Lead-free packages
- Recommended torque: 0.4 to 0.6 N·m (TO-220AB)

2.1 DPAK package information
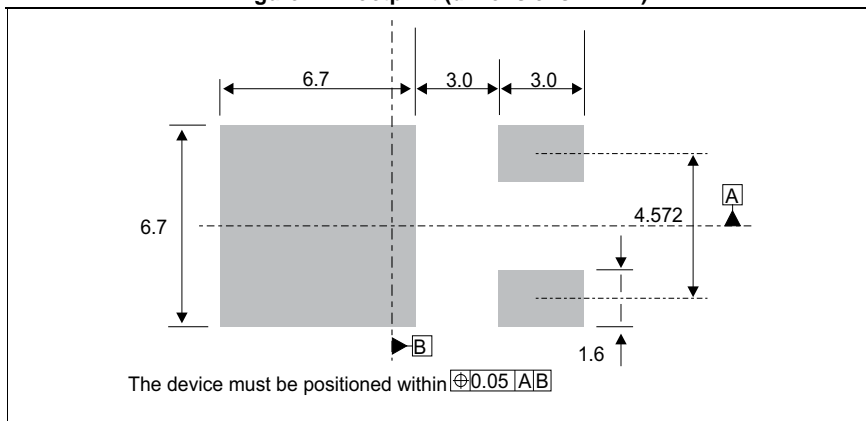
Figure 13. DPAK package outline

Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Table 4. DPAK package mechanical data

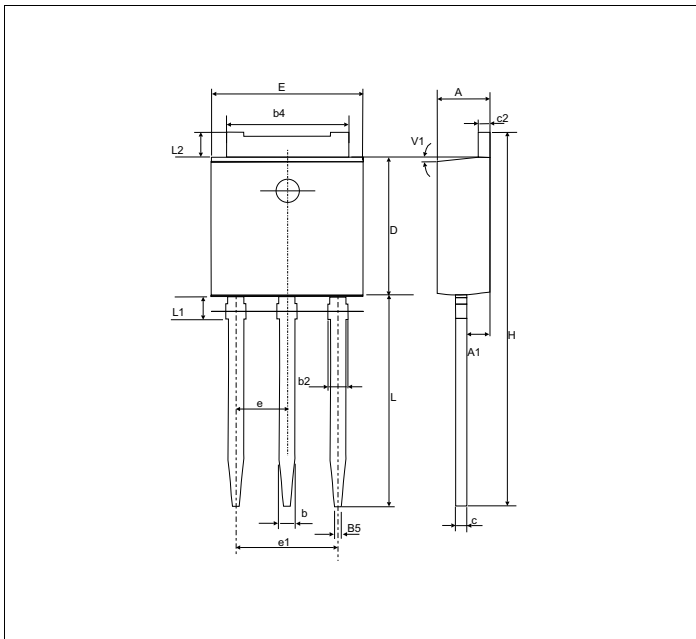| Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.9		1.10	0.0354		0.0433
A2	0.03		0.23	0.0012		0.0091
b	0.64		0.90	0.0252		0.0354
b4	4.95		5.46	0.1949		0.2150
c	0.46		0.61	0.0181		0.0236
c2	0.46		0.60	0.0181		0.0236
D	5.97		6.22	0.2350		0.2449
D1	4.95		5.60	0.1949		0.2205
E	6.35		6.73	0.2500		0.2650
E1	4.32		5.50	0.1701		0.2165
e		2.286			0.0900	
e1	4.40		4.70	0.1732		0.1850
H	9.35		10.40	0.3681		0.4094
L	1.0		1.78	0.0394		0.0701
L2			1.27			0.0500
L4	0.6		1.02	0.0236		0.0402
V2	-8°		+8°	-8°		+8°

1. Inches only for reference.

Figure 14. Footprint (dimensions in mm)

2.2   IPAK package information

Figure 15. IPAK package outline

Note: *This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.*
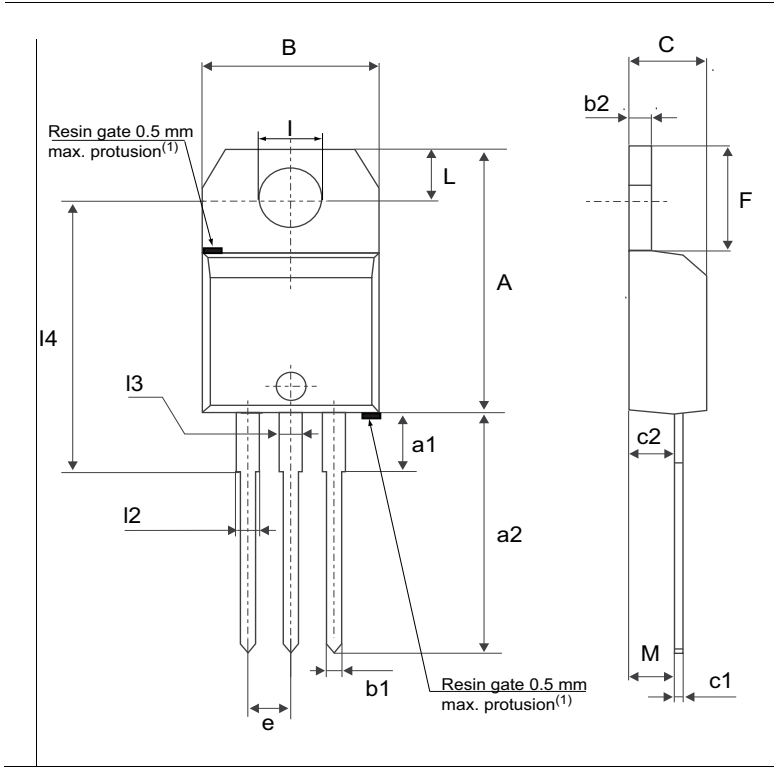
Table 5. IPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.0866		0.0945
A1	0.90		1.10	0.0354		0.0433
b	0.64		0.90	0.0252		0.0354
b2			0.95			0.0374
b4	5.20		5.43	0.2047		0.2138
B5		0.30			0.0118	
c	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6.00		6.20	0.2362		0.2441
E	6.40		6.65	0.2520		0.2618
e		2.28			0.0898	
e1	4.40		4.60	0.1732		0.1811
H		16.10			0.6339	
L	9.00		9.60	0.3543		0.3780
L1	0.80		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

1.   Inches dimensions given only for reference.

2.3   TO-220AB package information

Figure 16. TO-220AB package outline

Resin gate 0.5 mm max. protusion[1]

Resin gate 0.5 mm max. protusion[1]

(1)Resin gate position accepted in one of the two positions or in the symmetrical opposites.

Table 6. TO-220AB package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.2		15.9	0.5984		0.6260
a1		3.75			0.1476	
a2	13		14	0.5118		0.5512
B	10		10.4	0.3937		0.4094
b1	0.61		0.88	0.0240		0.0346
b2	1.23		1.32	0.0484		0.0520
C	4.4		4.6	0.1732		0.1811
c1	0.49		0.7	0.0193		0.0276
c2	2.4		2.72	0.0945		0.1071
e	2.40		2.70	0.0945		0.1063
F	6.2		6.6	0.2441		0.2598
I	3.73		3.88	0.1469		0.1528
L	2.65		2.95	0.1043		0.1161
I2	1.14		1.7	0.0449		0.0669
I3	1.14		1.7	0.0449		0.0669
I4	15.8	16.4	16.8	0.6220	0.6457	0.6614
M		2.6			0.1024	

1. Inches dimensions given only for reference.

2.4 D²PAK package information

Figure 17. D²PAK package outline

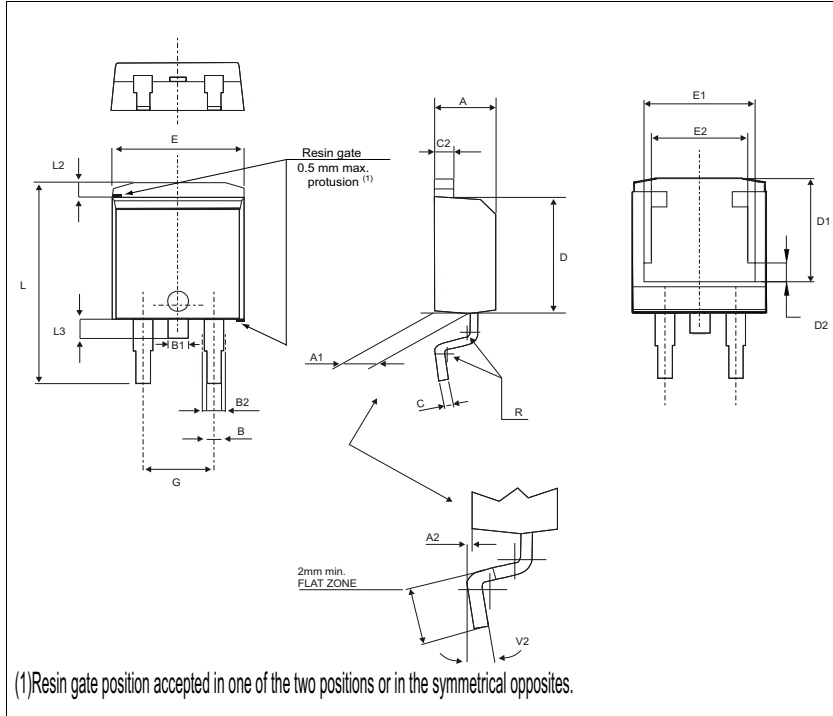(1)Resin gate position accepted in one of the two positions or in the symmetrical opposites.

Table 7. D²PAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.30		4.60	0.1693		0.1811
A1	2.49		2.69	0.0980		0.1059
A2	0.03		0.23	0.0012		0.0091
B	0.70		0.93	0.0276		0.0366
B2	1.25	1.40		0.0492	0.0551	
C	0.45		0.60	0.0177		0.0236
C2	1.21		1.36	0.0476		0.0535
D	8.95		9.35	0.3524		0.3681
D1	7.50		8.0	0.2953		0.3150
D2	1.3		1.7	0.0512		0.0669
E	10.00		10.28	0.3937		0.4047
E1	8.3		8.7	0.3268		0.3425
E2	6.85		7.25	0.2697		0.2854
G	4.88		5.28	0.1921		0.2079
L	15.00		15.85	0.5906		0.6240
L2	1.27		1.40	0.0500		0.0551
L3	1.40		1.75	0.0551		0.0689
R		0.40			0.0157	
V2	0°		8°	0°		8°

1. *Inches dimensions given only for reference.*

Figure 18. Footprint (dimensions in mm)
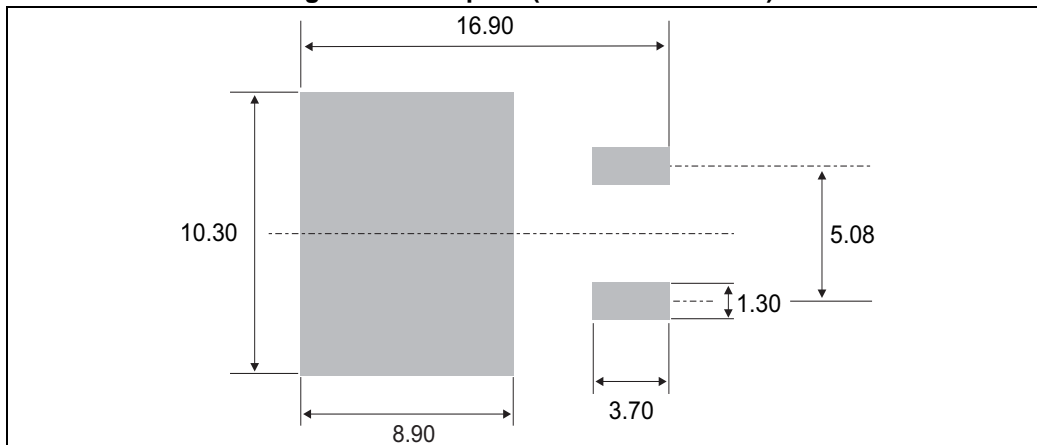
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