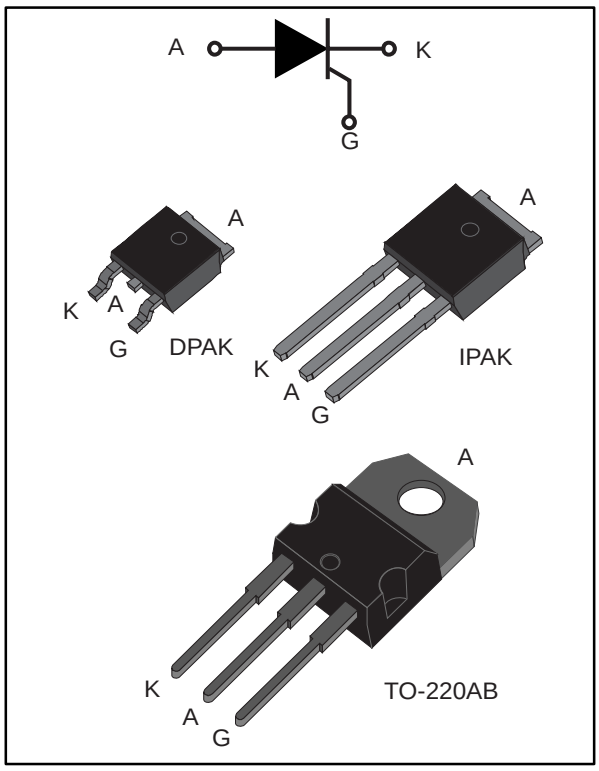
SZGKT
SEMICONDUCTOR

TS1220

Sensitive 12 A SCRs

Datasheet - production data



Features

- On-state RMS current, $I_{T(RMS)}$ 12 A
- Repetitive peak off-state voltage, V_{DRM}/V_{RRM} 600 V
- Triggering gate current, I_{GT} 200 µA

Applications

- Capacitive ignition circuit for motorcycle engine
- DC brush motor drive for power tool or kitchen appliance
- Gas ignitor circuit
- Regulator driver for battery charger

Description

Thanks to highly sensitive triggering levels, the 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.

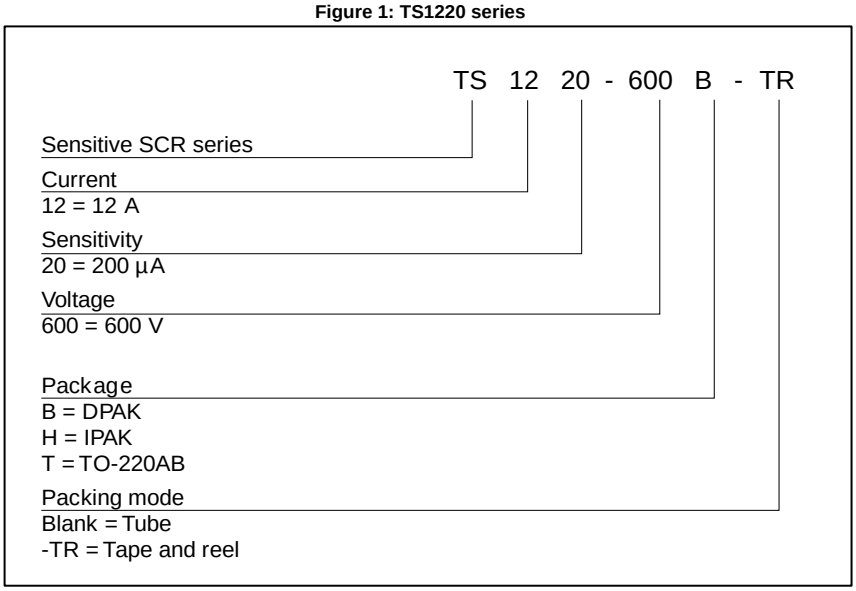
Available in through-hole or surface-mount packages, they provide an optimized performance in a limited space.

Table 1: Device summary

Order code	V_{DRM}/V_{RRM}	I_{GT}	Package
TS1220-600B	600 V	0.2 mA	DPAK
TS1220-600B-TR		0.2 mA	DPAK
TS1220-600H		0.2 mA	IPAK
TS1220-600T		0.2 mA	TO-220AB

1 Ordering information

Figure 1: TS1220 series



2 Characteristics

Table 2: Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state RMS current (180° conduction angle)		T_c = 105 °C	12	A
$I_{T(AV)}$	Average on-state current (180° conduction angle)		T_c = 105 °C	8	A
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	T_j = 25 °C	115	A
		t_p = 10 ms		110	
I^2t	I^2t value for fusing	t_p = 10 ms	T_j = 25 °C	60	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, $t_r \leq$ 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}	Storage junction temperature range			- 40 to + 150	°C
T_j	Operating junction temperature range			- 40 to + 125	

Table 3: Sensitive electrical characteristics (Tj = 25 °C, unless otherwise specified)

Symbol	Test conditions				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} = 220 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} = 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	T_j =125 °C	MIN.	5	V/µs
V_{TM}	I_{TM} = 24 A t_p = 380 µs	T_j = 25 °C	MAX.	1.6	V
V_{t0}	Threshold voltage	T_j = 125 °C	MAX.	0.85	V
R_d	Dynamic resistance	T_j = 125 °C	MAX.	30	mΩ
I_{DRM}	V_{DRM} = V_{RRM}, R_{GK} = 1 kΩ	T_j = 25 °C	MAX.	5	µA
I_{RRM}		T_j = 125 °C		2	mA

Table 4: Thermal resistance

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

Notes:

(1)S = Copper surface under tab

2.1 Characteristics (curves)

Figure 2: Maximum average power dissipation versus average on-state current

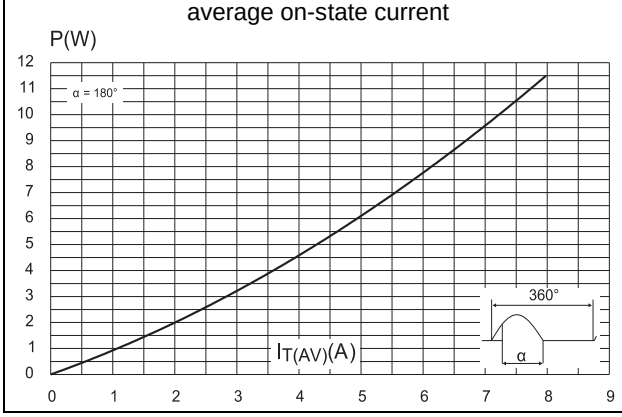


Figure 3: Average and DC on-state current versus case temperature

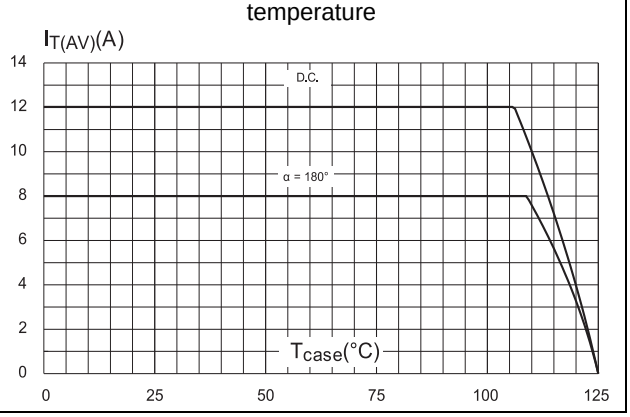


Figure 4: Average and DC on-state current versus ambient temperature (DPAK)

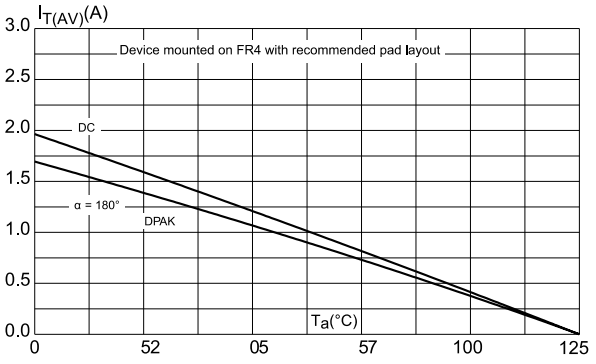


Figure 5: Relative variation of thermal impedance junction to case versus pulse duration

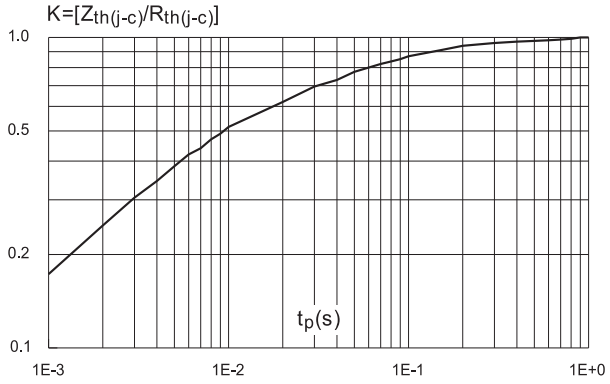


Figure 6: Relative variation of thermal impedance junction to ambient versus pulse duration

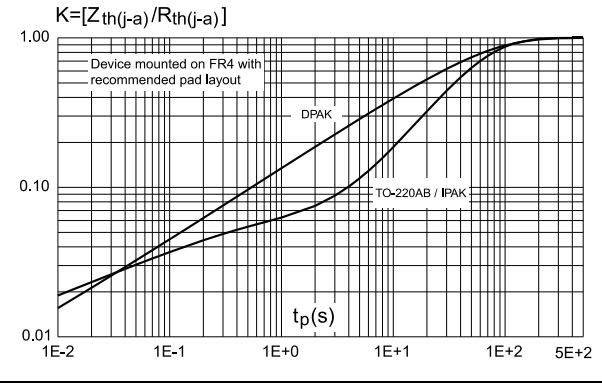


Figure 7: Relative variation of gate trigger and holding current versus junction temperature

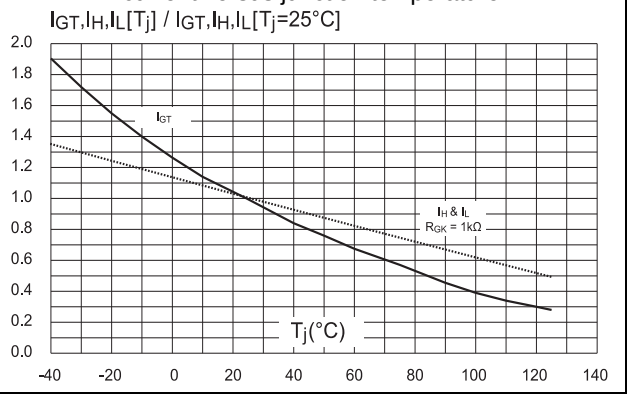


Figure 8: Relative variation of holding current versus gate-cathode resistance (typical values)

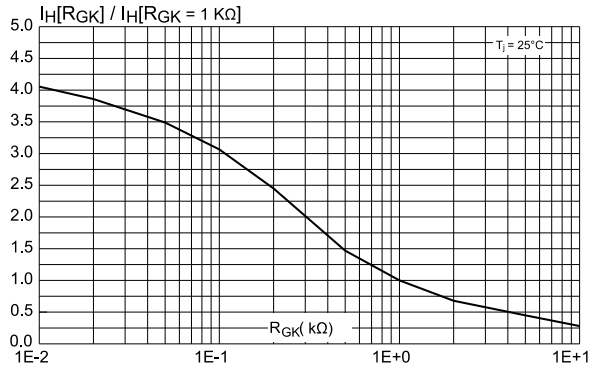


Figure 9: Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

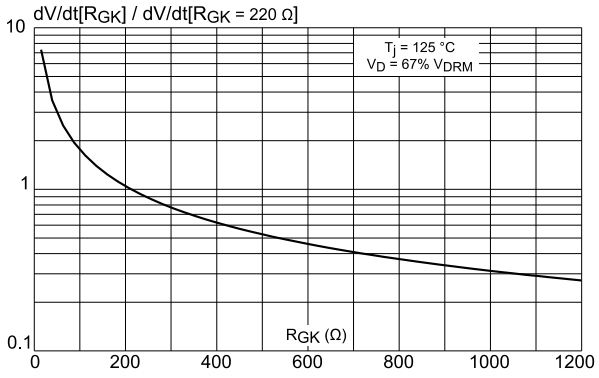


Figure 10: Relative variation of dV/dt immunity current versus gate-cathode capacitance (typical values)

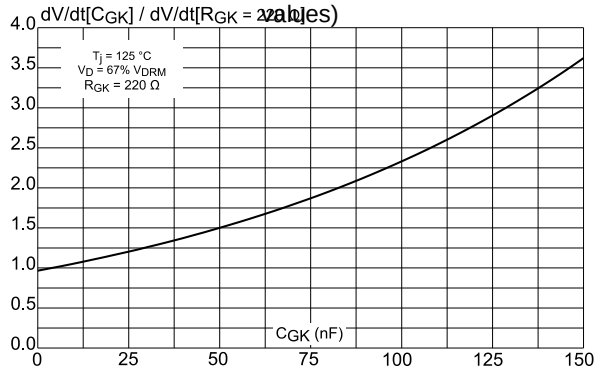


Figure 11: Surge peak on-state current versus number of cycles

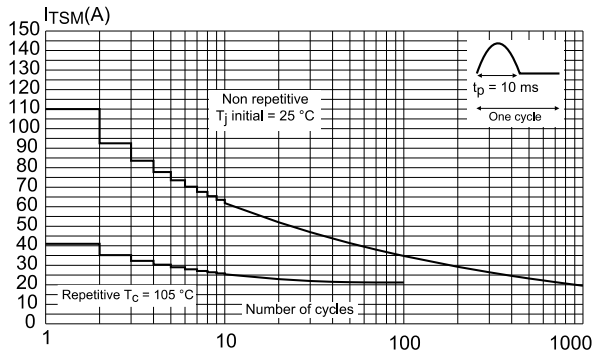


Figure 12: Non-repetitive surge peak on-state current and corresponding values versus sinusoidal pulse width

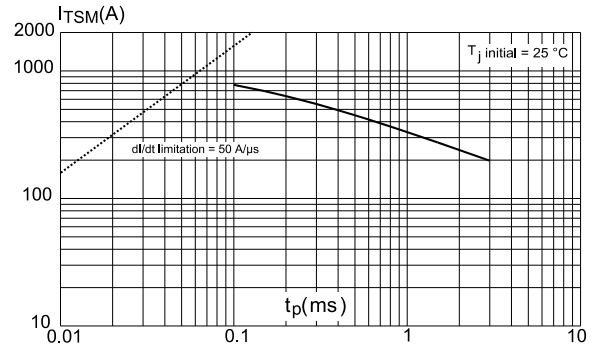
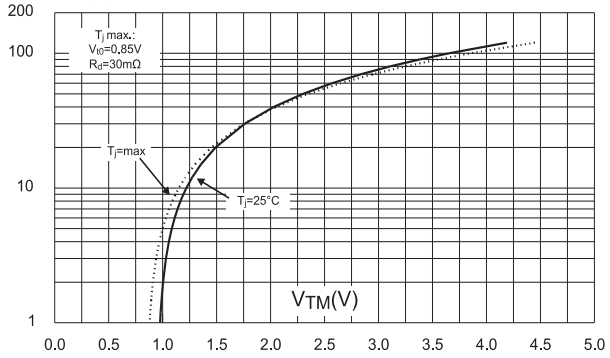


Figure 13: On-state characteristics (maximum values)



3 Package information

Lead free lead plating; halogen free molding compound.

3.1 DPAK package mechanical data

Figure 14: DPAK package outline

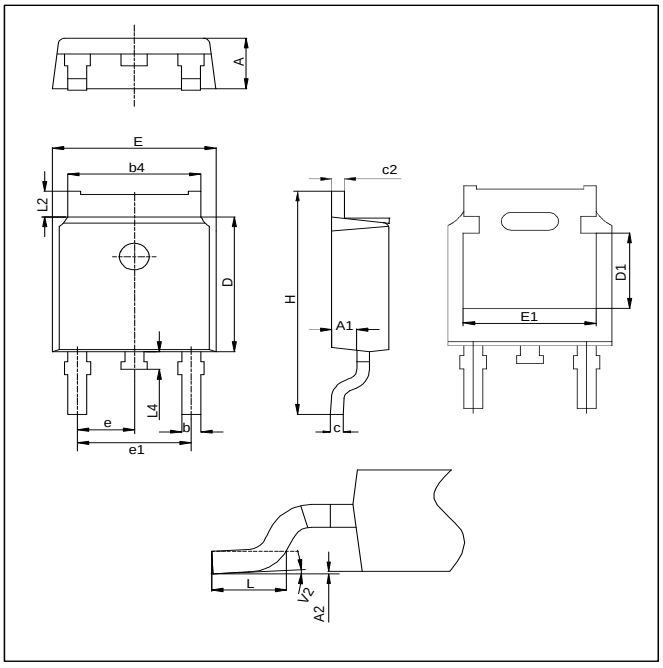


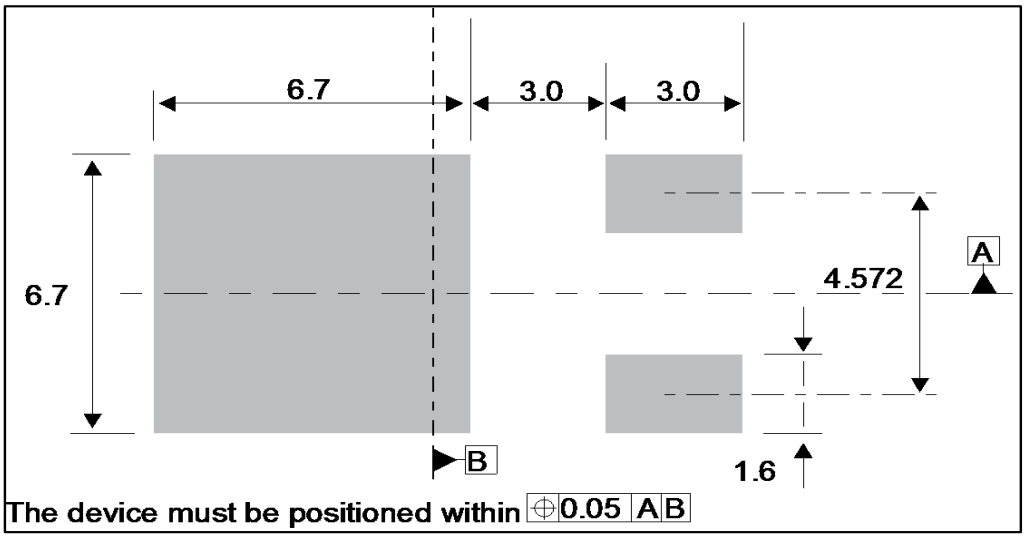
Table 5: DPAK mechanical data

Dim.	mm			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.90		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		0.0240
c2	0.46		0.60	0.0181		0.0240
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	1.00		1.78	0.0394		0.0701
L2			1.27			0.0500
L4	0.60		1.02	0.0236		0.0402
V2	-8°		8°	-8°		8°

Notes:

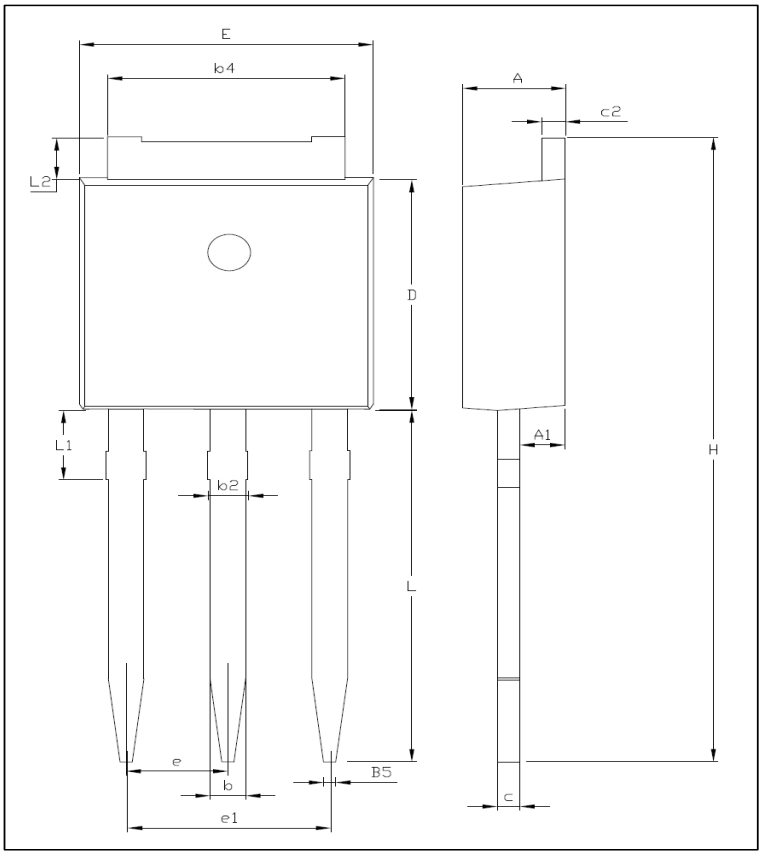
(1)Inch dimensions are for reference only.

Figure 15: DPAK recommended footprint (dimensions are in mm)



3.2 IPAK package information

Figure 16: IPAK (TO-251) package outline



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

Table 6: IPAK (TO-251) package mechanical data

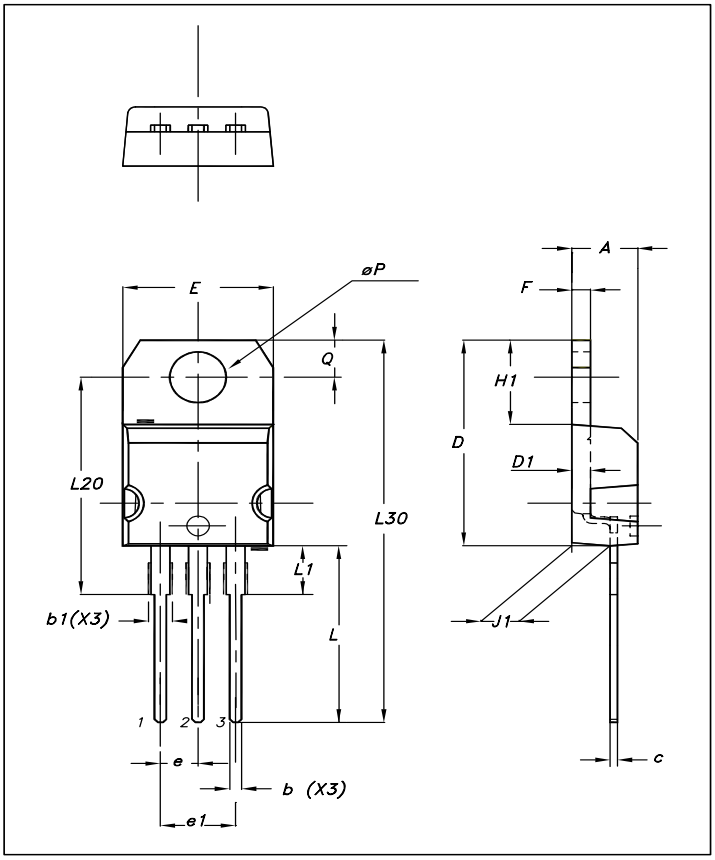
Ref.	Dimensions					
	Millimiters			Inches(1)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.0866		0.0945
A1	0.90		1.10	0.0354		0.0433
b	0.64		0.90	0.0252		0.0354
b2			0.95			0.0374
b4	5.20		5.43	0.2047		0.2138
B5		0.30			0.0125	
c	0.45		0.60	0.0177		0.0236
c2	0.46		0.60	0.0181		0.0236
D	6.00		6.20	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	0.3545		0.3780
L1	0.80		1.20	0.0315		0.0472
L2		0.80	1.25		0.0315	0.0492
V1		10°			10°	

Notes:

(1)Inch dimensions are for reference only.

3.3 TO-220AB package information

Figure 17: TO-220AB package outline



220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches[1]	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1732	0.1811
b	0.61	0.88	0.0240	0.0346
b1	1.14	1.70	0.0449	0.0669
c	0.48	0.70	0.0189	0.0276
D	15.25	15.75	0.6004	0.6201
D1	1.27 typ.		0.0500 typ.	
E	10.00	10.40	0.3937	0.4094
e	2.40	2.70	0.0945	0.1063
e1	4.95	5.15	0.1949	0.2028
F	1.23	1.32	0.0484	0.0520
H1	6.20	6.60	0.2441	0.2598
J1	2.40	2.72	0.0945	0.1071
L	13.00	14.00	0.5118	0.5512
L1	3.50	3.93	0.1378	0.1547
L20	16.40 typ.		0.6457 typ.	
L30	28.90 typ.		1.1378 typ.	
ØP	3.75	3.85	0.1476	0.1516
Q	2.65	2.95	0.1043	0.1161

Notes:

[1]Inch dimensions are for reference only.