



SPN75T04

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN75T04 is the N-Channel logic enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier application, Motor control power management and other Power Tool circuits. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

FEATURES

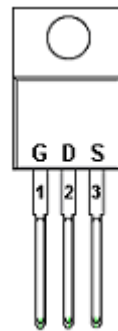
- ◆ 45V/15A, $R_{DS(ON)}=9.5m\Omega@V_{GS}=10V$
- ◆ 45V/8A, $R_{DS(ON)}=14m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-251S-3L/PPAK5x6-8L package design

APPLICATIONS

- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Motor Control
- Power Tool

PIN CONFIGURATION

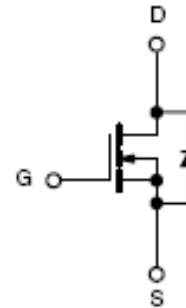
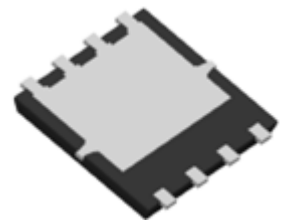
TO-220



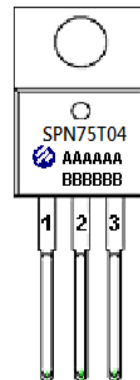
TO-251



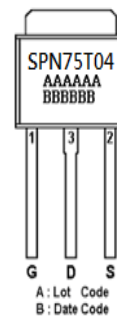
PPAK 5x6



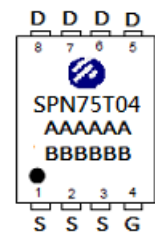
PART MARKING



A : Lot Code
B : Date Code
(YY/MM/DD)



A : Lot Code
B : Date Code



A : Lot Code
B : Date Code
(YY/MM/DD)



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TO-220/TO-251 PIN DESCRIPTION

Pin	Symbol	Description
1	G	Gate
2	D	Drain
3	S	Source

PPAK5x6 PIN DESCRIPTION

Pin	Symbol	Description
1	S	Source
2	S	Source
3	S	Source
4	G	Gate
5	D	Drain
6	D	Drain
7	D	Drain
8	D	Drain

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN75T04T220TGB	TO-220-3L	SPN75T04
SPN75T04ST251TGB	TO-251	SPN75T04
SPN75T04DN8RGB	PPAK5x6	SPN75T04

- ※ SPN75T04T220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN75T04T251TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN75T04DN8RGB : Tape&Reel ; Pb – Free ; Halogen - Free



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ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V _{DSS}	45	V
Gate –Source Voltage		V _{GSS}	±20	V
Continuous Drain Current (TO-220)	T _c =25°C	I _D	75	A
	T _c =100°C		58	
Continuous Drain Current (TO-251/PPAK5X6)	T _c =25°C	I _D	56	A
	T _c =100°C		39	
Pulsed Drain Current (TO-220)		I _{DM}	280	A
Pulsed Drain Current (TO-251/PPAK5X6)		I _{DM}	150	A
Power Dissipation @ T _c =25°C	TO-220	P _D	105	W
Power Dissipation @ T _c =25°C	TO251/		62.5	
Power Dissipation @ T _c =25°C	PPAK5X6		50	
Avalanche Energy with Single Pulse (T _c =25°C, L = 0.4mH.)		E _{AS}	20	mJ
Operating Junction Temperature		T _J	-55/150	°C
Storage Temperature Range		T _{STG}	-55/150	°C
Thermal Resistance-Junction to Case (TO-220)		R _{θJC}	0.85	°C/W
Thermal Resistance-Junction to Case (TO-251)		R _{θJC}	2.4	°C/W
Thermal Resistance-Junction to Case (PPAK5X6)		R _{θJC}	1.8	°C/W



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ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	45			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.55	2.2	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=45V, V_{GS}=0V, T_J=25^\circ C$			1	uA
		$V_{DS}=45V, V_{GS}=0V, T_J=100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$		7.5	9.5	mΩ
		$V_{GS}=4.5V, I_D=8A$		10	14	
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=10A$		25		S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=\text{Open}, f=1\text{MHz}$		1.5		Ω
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge (10V)	Q_g	$V_{DS}=20V, V_{GS}=10V$ $I_D=10A$		14.5		nC
Total Gate Charge (4.5V)	Q_g			7		
Gate-Source Charge	Q_{gs}			2		
Gate-Drain Charge	Q_{gd}			2.5		
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V$ $f=1\text{MHz}$		942		pF
Output Capacitance	C_{oss}			309		
Reverse Transfer Capacitance	C_{rss}			29		
Turn-On Time	$t_{d(on)}$	$V_{DD}=20V, I_D=10A, V_{GS}=10V$ $R_G=10\Omega$		6		nS
	t_r			5		
Turn-Off Time	$t_{d(off)}$			21		
	t_f			5		
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$		1.5		Ω



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

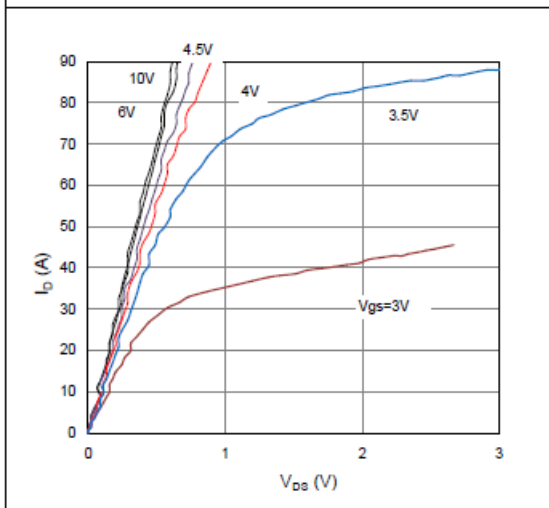


Figure 2. On-Resistance vs. Gate-Source Voltage

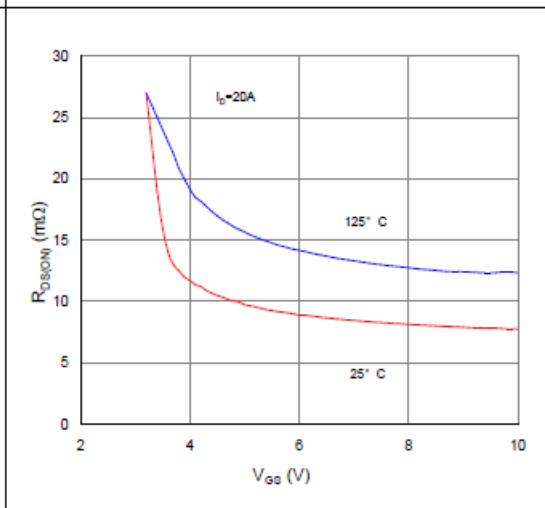


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

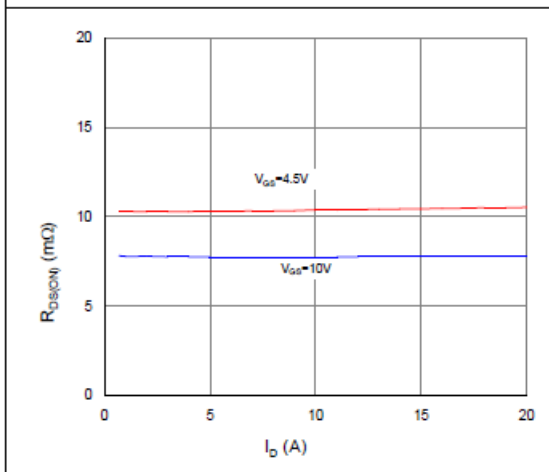


Figure 4. Normalized On-Resistance vs. Junction Temperature

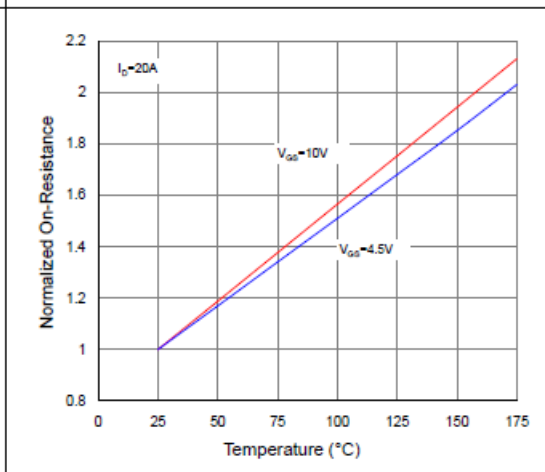


Figure 5. Typical Transfer Characteristics

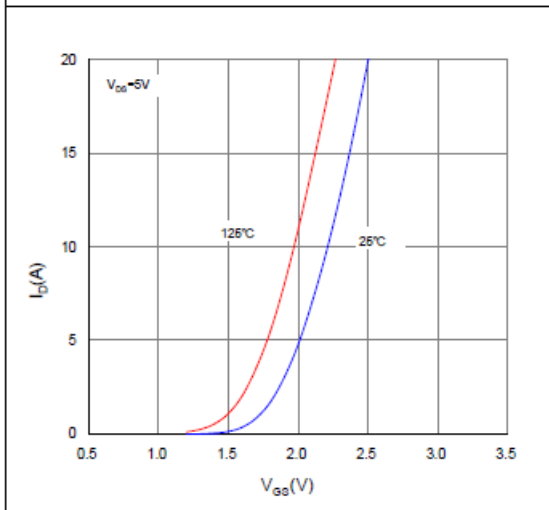
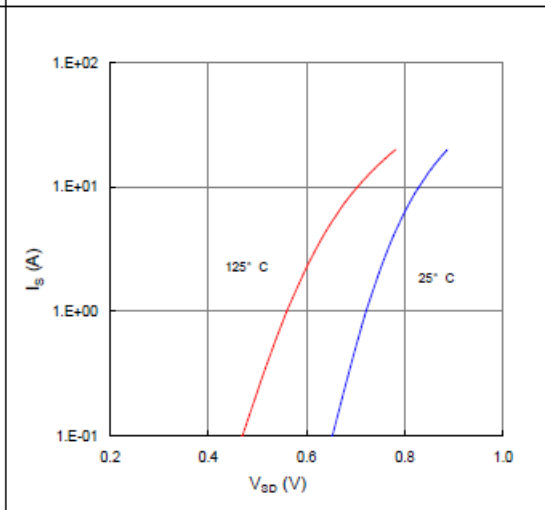


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

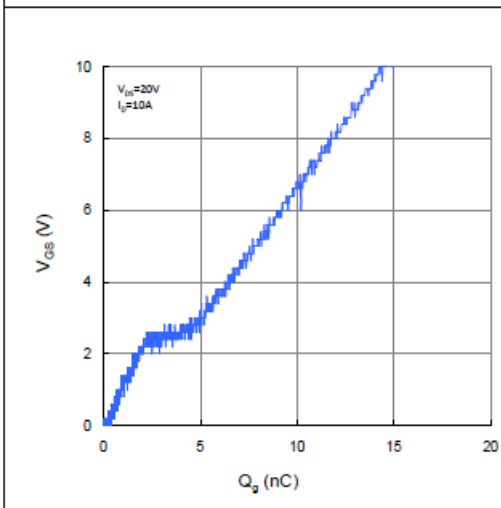


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

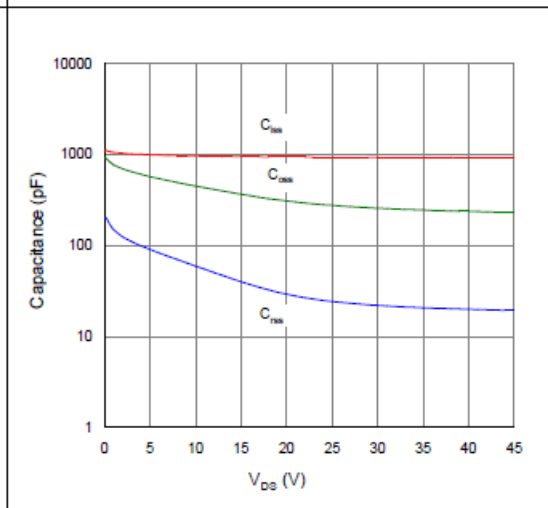


Figure 9. Maximum Safe Operating Area

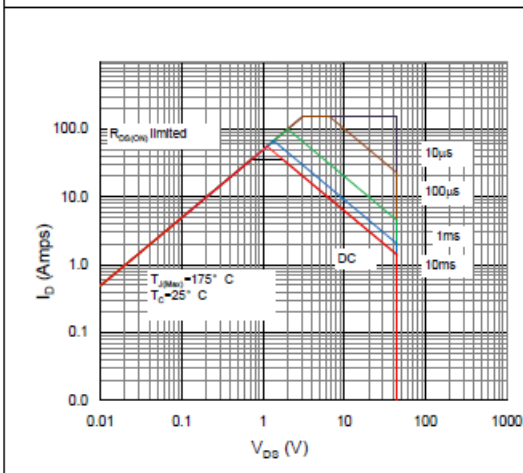


Figure 10. Maximum Drain Current vs. Case Temperature

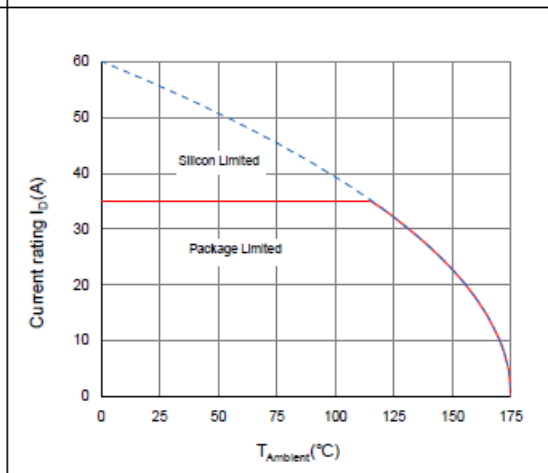
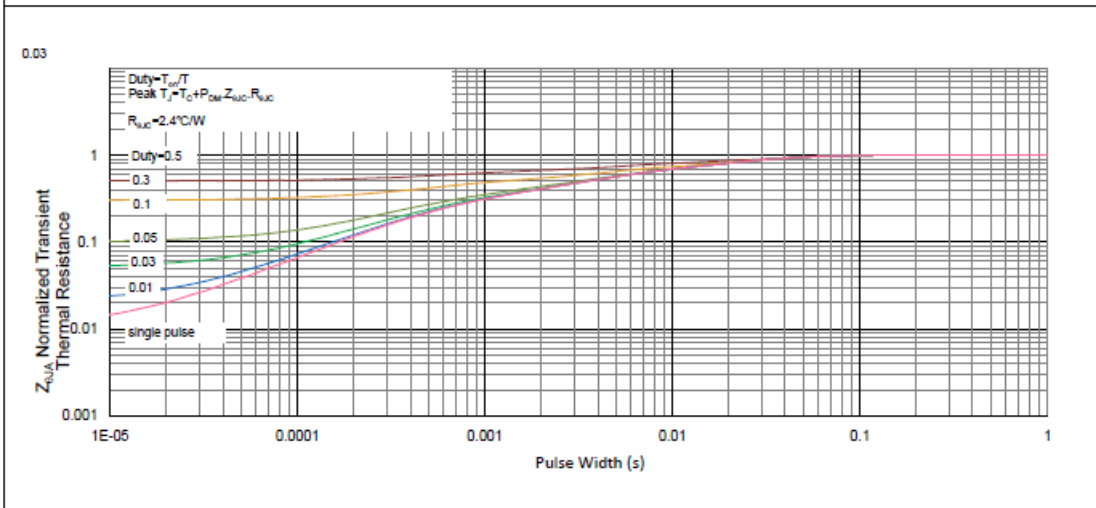


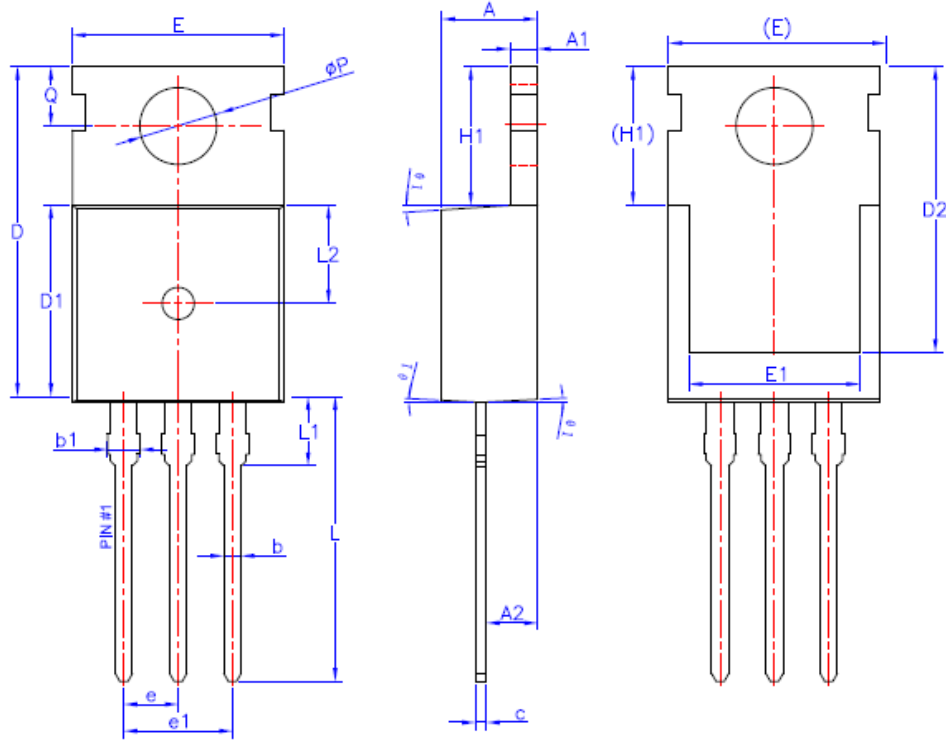
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient





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TO-220 PACKAGE OUTLINE



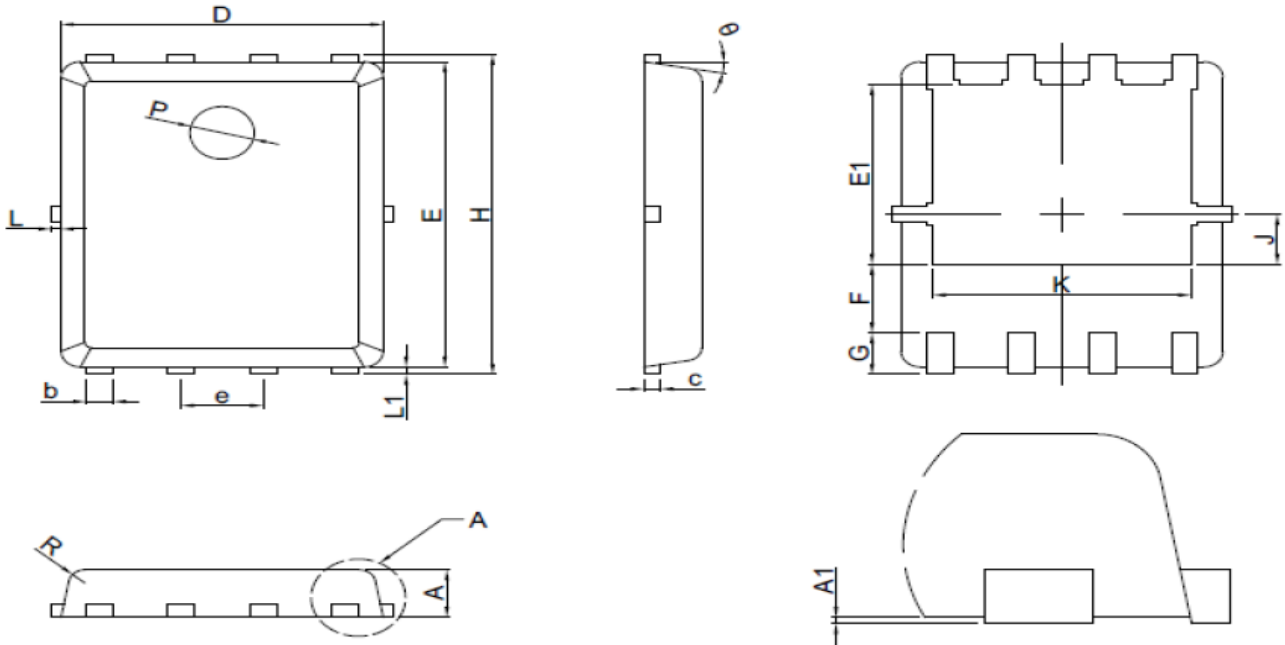
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.42	—	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	—	—	3.50
L2	4.60REF		
øP	3.55	3.60	3.65
Q	2.73	—	2.87
ø1	1°	3°	5°



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PPAK5X6 PACKAGE OUTLINE

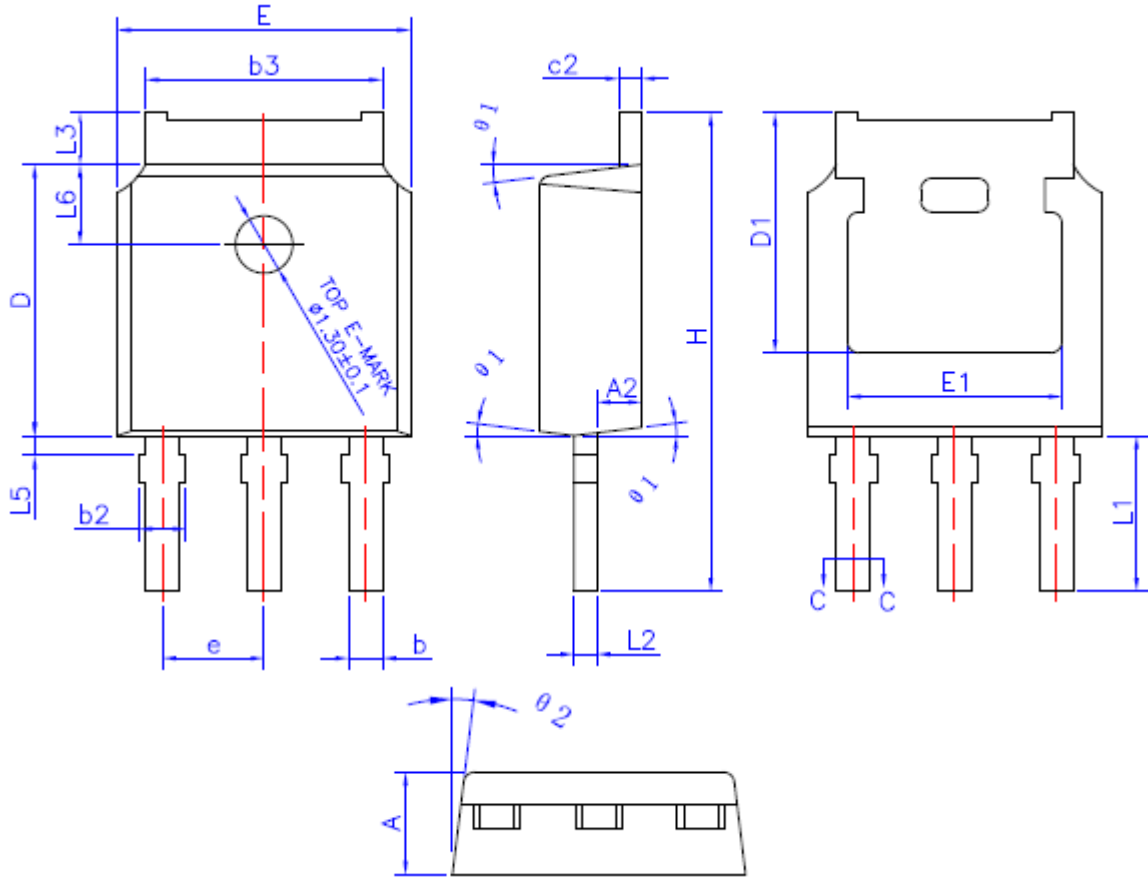


SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.8	0.95	1.1
A1	0.00	0.03	0.05
b	0.33	0.41	0.51
c	0.254 REF		
D	4.80	4.95	5.10
F	1.40 REF		
E	5.70	5.80	5.90
e	1.27 BSC		
H	5.90	6.05	6.20
L1	0.06	0.13	0.20
G	0.60 REF		
J	0.95 BSC		
K	4.00 REF		
L	---	----	0.20
P	1.00 REF		
E1	3.40REF		
E2	0.95 REF		
θ	6°	10°	14°
R	0.25REF		



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TO-251 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	10.40	10.70	11.00
L1	3.50 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L5	0.15	—	0.75
L6	1.80 REF		
$\theta 1$	5°	7°	9°
$\theta 2$	5°	7°	9°



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