



SPN70T10

N-Channel Enhancement Mode MOSFET

TO-220/TO-220F/TO-251/TO-252 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
SPN70T10T220TGB	TO-220-3L	SPN70T10
SPN70T10T220FTGB	TO-220F-3L	SPN70T10
SPN70T10ST251TGB	TO-251	SPN70T10
SPN70T10T252RGB	TO-252	SPN70T10
SPN70T10DN8RGB	PPAK5X6	SPN70T10

- ※ SPN70T10T220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN70T10T220FTGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN70T10ST251TGB : Tube ; Pb – Free ; Halogen - Free
- ※ SPN70T10T252RGB : Tape Reel ; Pb – Free ; Halogen – Free
- ※ SPN70T10DN8RGB : Tape Reel ; Pb – Free ; Halogen – Free



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ABSOLUTE MAXIMUM RATINGS

(T_A=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V _{DSS}	100	V	
Gate –Source Voltage	V _{GSS}	±20	V	
Continuous Drain Current(T _J =150°C)	I _D	T _C =25°C	70	A
		T _C =70°C	48	
Pulsed Drain Current	I _{DM}	160	A	
Power Dissipation@ T _C =25°C (TO-220/TO-220F)	P _D	110	W	
Power Dissipation@ T _C =25°C (TO-251/PPAK5X6)		83		
Power Dissipation@ T _C =25°C (TO-252)		72		
Avalanche Energy with Single Pulse (T _J =25°C , L = 1mH , I _{AS} = 22A , V _{DS} =100V.)	EAS	240	mJ	
Operating Junction Temperature	T _J	-55/150	°C	
Storage Temperature Range	T _{STG}	-55/150	°C	
Thermal Resistance-Junction to Ambient (TO-220/TO-220F)	R _{θJA}	62.5	°C/W	
Thermal Resistance-Junction to Ambient (TO-251/TO-252)	R _{θJA}	100	°C/W	
Thermal Resistance-Junction to Ambient (PPAK5X6)	R _{θJA}	55	°C/W	
Thermal Resistance-Junction to Case Top (PPAK5X6)	R _{θJc}	20	°C/W	
Thermal Resistance-Junction to Case Bottom (PPAK5X6)	R _{θJc}	2.2	°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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	1.9	2.4	V
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$ $T_J = 25^\circ C$			1	uA
		$V_{DS}=100V, V_{GS}=0V$ $T_J = 100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		9.5	12	mΩ
		$V_{GS}=4.5V, I_D=20A$		11.5	15	
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=\text{Open},$ $f=1\text{MHz}$		1.5		Ω
Diode Forward Voltage	V_{SD}	$I_F=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge	$Q_g(10V)$	$V_{DS}=50V, V_{GS}=10V$ $I_D=14A$		29		nC
Total Gate Charge	$Q_g(4.5V)$			14		
Gate-Source Charge	Q_{gs}			5		
Gate-Drain Charge	Q_{gd}			5		
Input Capacitance	C_{iss}	$V_{DD}=50V, V_{GS}=0V$ $f=1\text{MHz}$		2275		pF
Output Capacitance	C_{oss}			162		
Reverse Transfer Capacitance	C_{rss}			7.9		
Turn-On Time	$t_{d(on)}$	$V_{DD}=50V,$ $I_D=14A, V_{GS}=10V$ $R_G=10\Omega$		8		nS
	t_r			3		
Turn-Off Time	$t_{d(off)}$			26		
	t_f			4		
Reverse Recovery Time	t_{rr}	$V_R=50V, I_F=12A, d$ $I_F/dt=500A/\mu S$		33		nS
Reverse Recovery Charge	Q_{rr}			157		nC



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

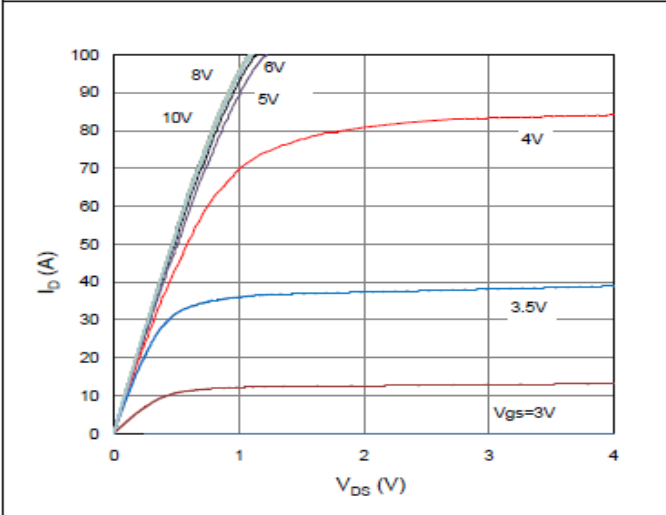


Figure 2. On-Resistance vs. Gate-Source Voltage

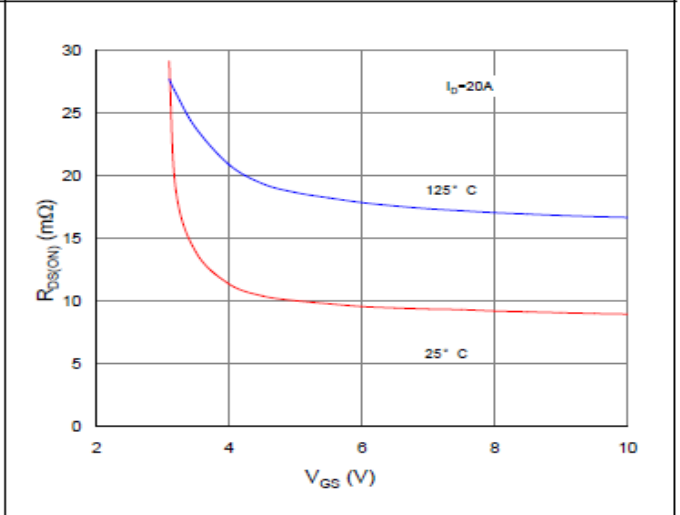


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

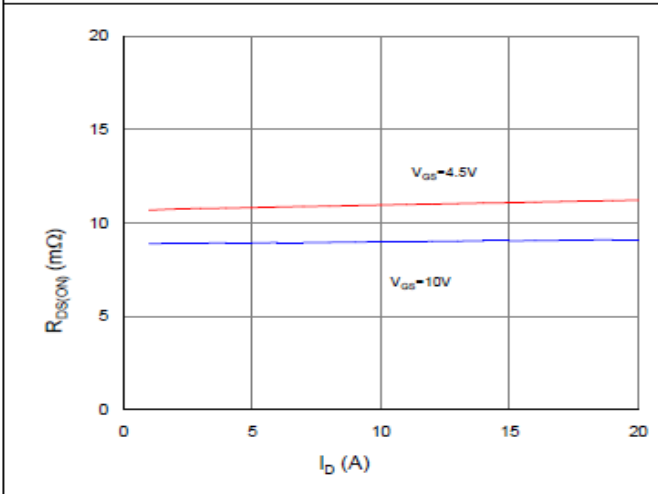


Figure 4. Normalized On-Resistance vs. Junction Temperature

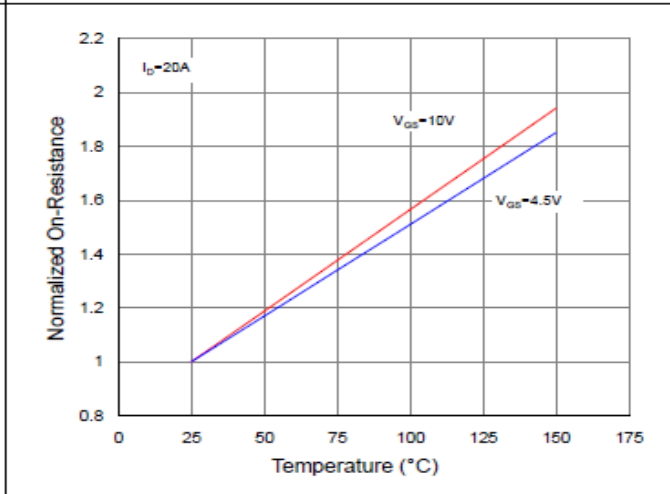


Figure 5. Typical Transfer Characteristics

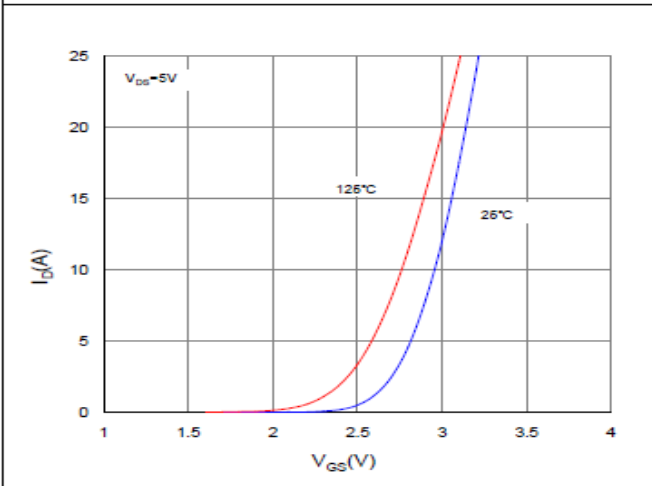
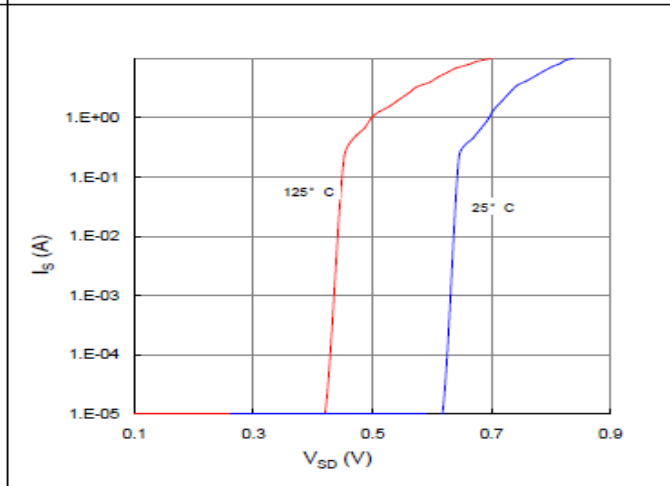


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

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

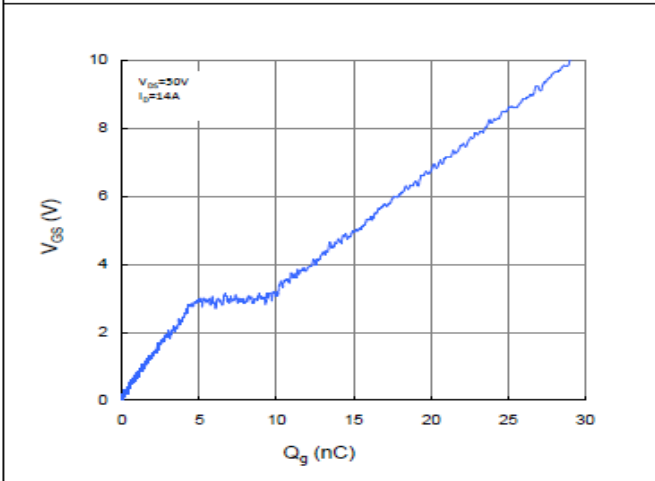


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

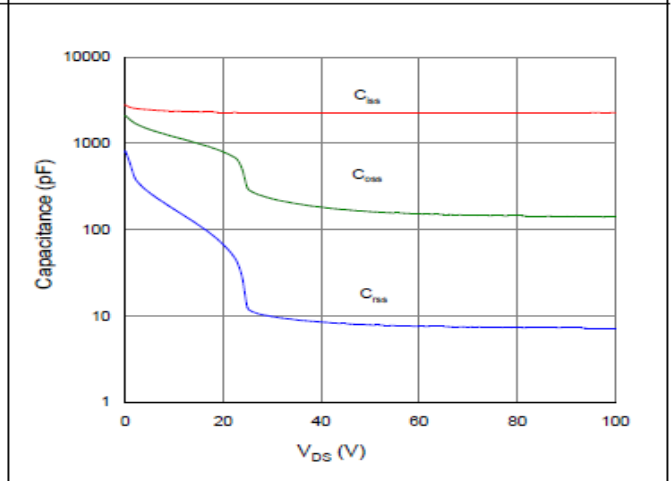


Figure 9. Maximum Safe Operating Area

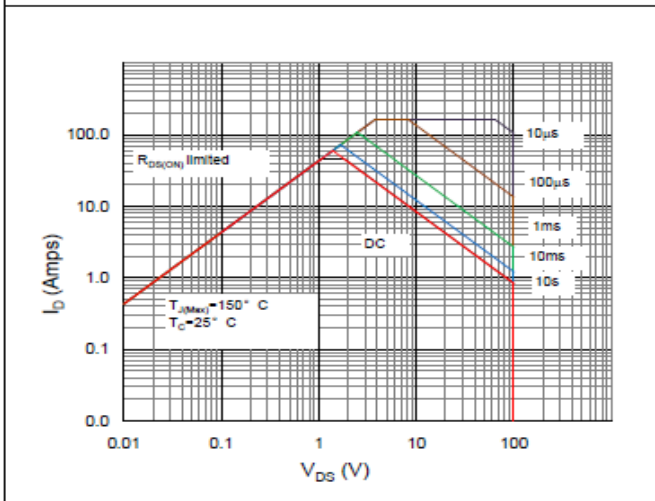


Figure 10. Maximum Drain Current vs. Case Temperature

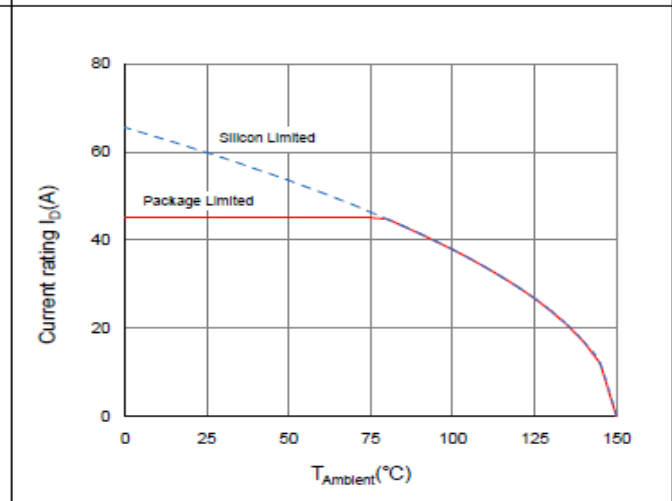
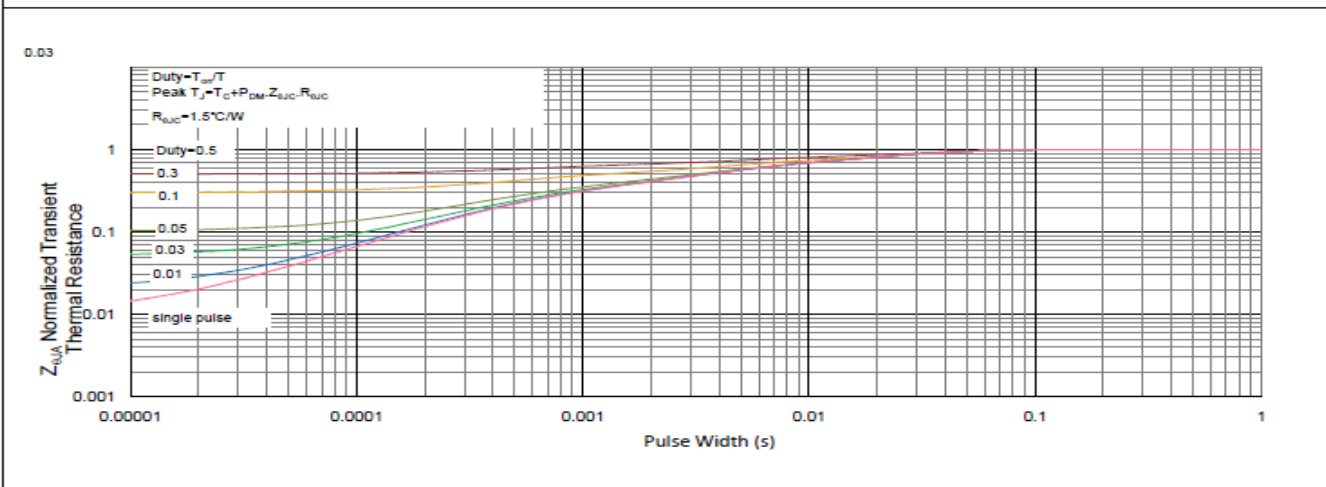


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

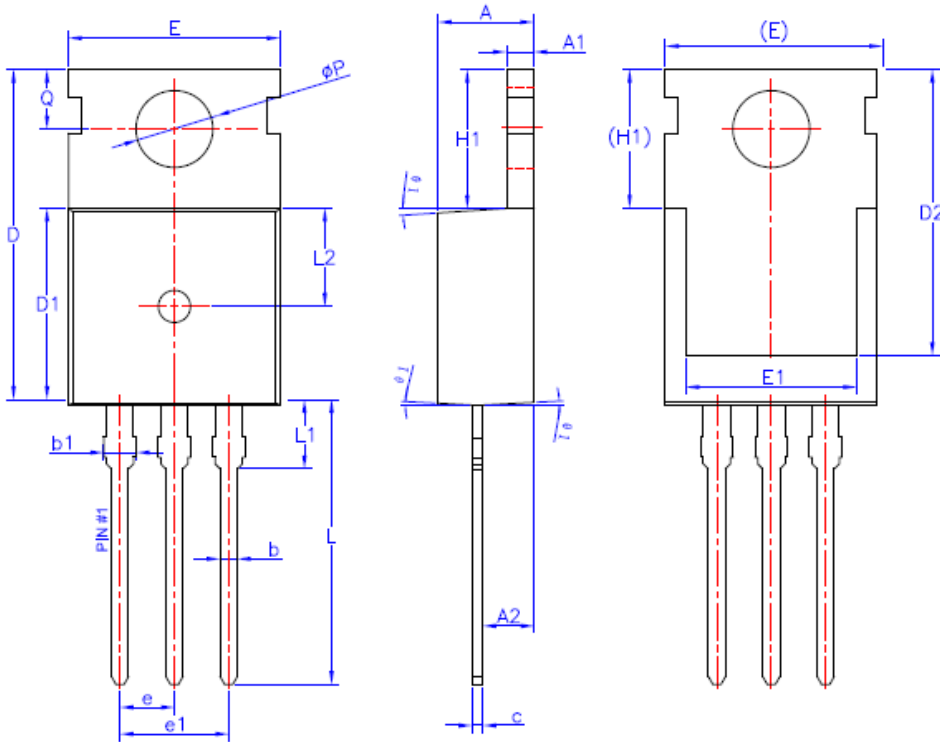




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TO-220-3L PACKAGE OUTLINE



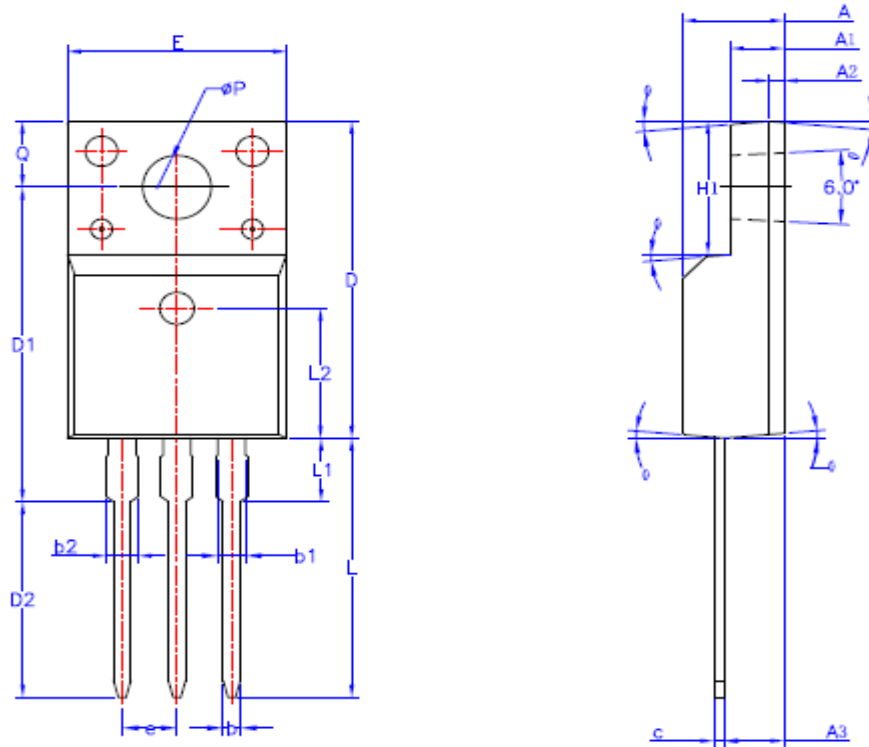
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.42	—	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	—	—	3.50
L2	4.60REF		
øP	3.55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



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TO-220F-3L PACKAGE OUTLINE



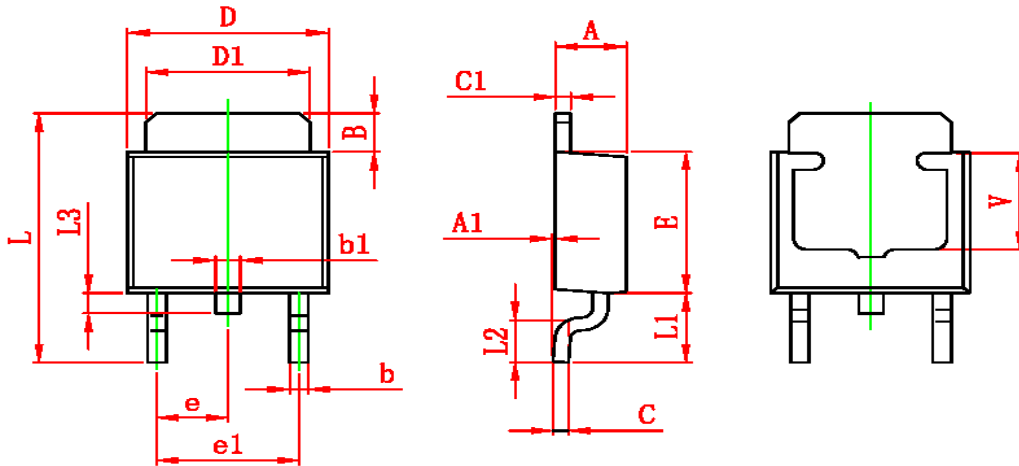
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	—	0.90
b1	1.18	—	1.38
b2	—	—	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	—	—	3.50
L2	6.50REF		
ϕP	3.08	3.18	3.28
Q	3.20	—	3.40
$\theta 1$	1°	3°	5°



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TO-252 PACKAGE OUTLINE



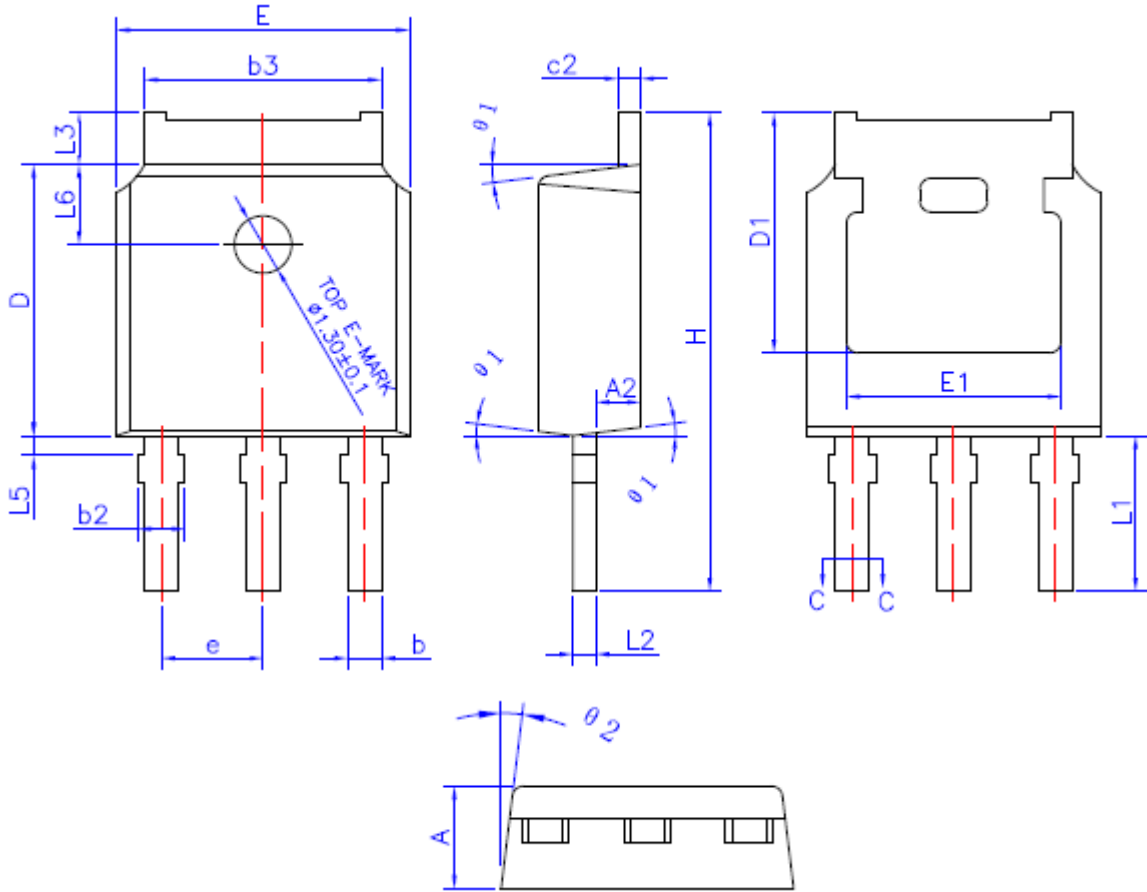
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
B	1.350	1.650	0.053	0.065
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	5.700	0.213	0.224
e	2.300 TYP		0.091 TYP	
e1	4.500	4.700	0.177	0.185
L	9.500	9.900	0.374	0.390
L1	2.550	2.900	0.100	0.114
L2	1.400	1.780	0.055	0.070
L3	0.350	0.650	0.014	0.026
V	3.80 REF		0.150 REF	



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TO-251 PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE =MILLIMETER)

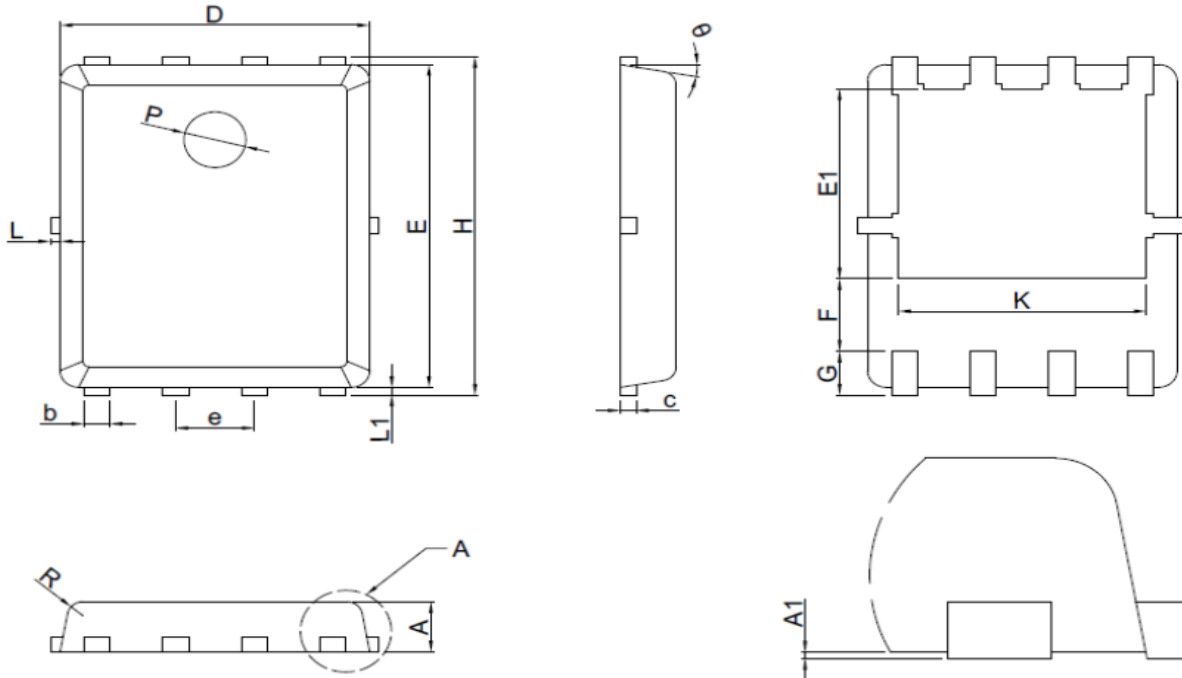
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A2	0.90	1.01	1.10
b	0.72	—	0.85
b1	0.71	0.76	0.81
b2	0.72	—	0.90
b3	5.13	5.33	5.46
c	0.47	—	0.60
c1	0.46	0.51	0.56
c2	0.47	—	0.60
D	6.00	6.10	6.20
D1	5.25	—	—
E	6.50	6.60	6.70
E1	4.70	—	—
e	2.186	2.286	2.386
H	10.40	10.70	11.00
L1	3.50 REF		
L2	0.508 BSC		
L3	0.90	—	1.25
L5	0.15	—	0.75
L6	1.80 REF		
θ_1	5°	7°	9°
θ_2	5°	7°	9°



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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		
K	4.00 REF		
L	---	---	0.20
P	1.00 REF		
E1	3.40REF		
θ	6°	10°	14°
R	0.25REF		



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