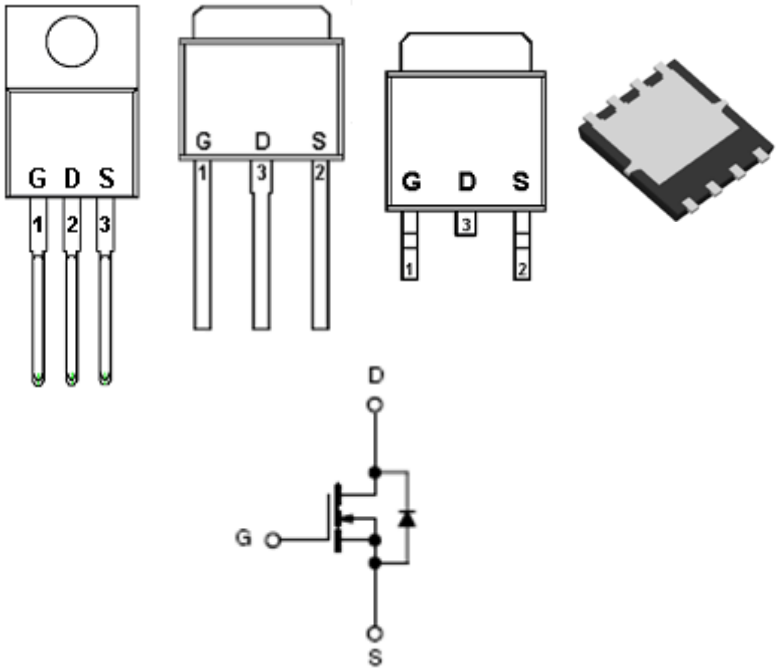
SPN70T10
N-Channel Enhancement Mode MOSFET

DESCRIPTION
The SPN70T10 is the N-Channel logic enhancement mode power field effect transistor which is produced using 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.

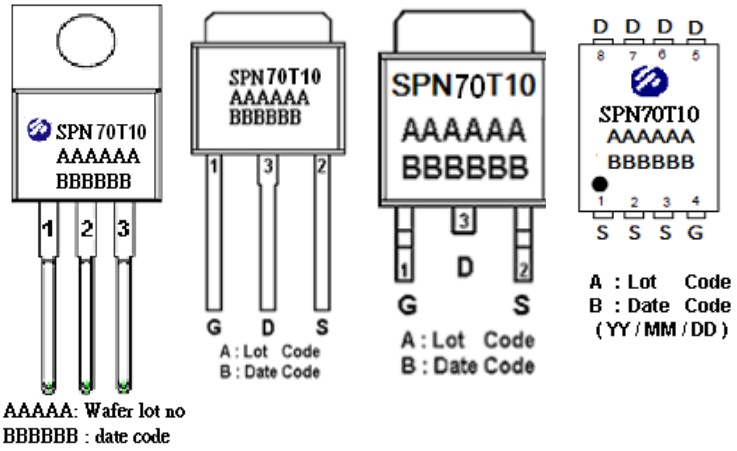
APPLICATIONS
- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Power Tool
- Motor Control

FEATURES
- 100V/70A, $R_{DS(ON)}$=12mΩ@V_{GS}=10V
- 100V/70A, $R_{DS(ON)}$=15mΩ@V_{GS}=4.5V
- Super high density cell design for extremely low RDS (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-220-3L/TO-251/TO-252/PPAK5X6 package design

PIN CONFIGURATION
TO-220 TO-251 TO-252 PPAK5X6



PART MARKING



AAAAA: Wafer lot no
BBBBBB : date code

TO-220/TO-220F/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
SPN70T10ST251TGB	TO-251	SPN70T10
SPN70T10T252RGB	TO-252	SPN70T10
SPN70T10DN8RGB	PPAK5X6	SPN70T10

※ SPN70T10T220TGB : 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

SPN70T10
N-Channel Enhancement Mode MOSFET

ABSOULTE MAXIMUM RATINGS

(T_A=25℃ 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℃)	T_C=25℃	I_D	70	A
	T_C=70℃		48	
Pulsed Drain Current		I_{DM}	160	A
Power Dissipation@ T_C=25℃ (TO-220)		P_D	110	W
Power Dissipation@ T_C=25℃ (TO-251/PPAK5X6)			83	
Power Dissipation@ T_C=25℃ (TO-252)			72	
Avalanche Energy with Single Pulse (Tj=25℃, L = 1mH , I_{AS} = 22A , V_{DS} =100V.)		EAS	240	mJ
Operating Junction Temperature		T_J	-55/150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Ambient (TO-220)		$R_{\theta JA}$	62.5	℃/W
Thermal Resistance-Junction to Ambient (TO-251/TO-252)		$R_{\theta JA}$	100	℃/W
Thermal Resistance-Junction to Ambient (PPAK5X6)		$R_{\theta JA}$	55	℃/W

ELECTRICAL CHARACTERISTICS

(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=250uA	100			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.4	1.9	2.4	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V T_J = 25℃			1	uA
		V_{DS}=100V,V_{GS}=0V T_J = 100℃			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	
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=1MHz		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=10Ω		8		nS
	t_r			3		
Turn-Off Time	$t_{d(off)}$			26		
	t_f			4		

TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

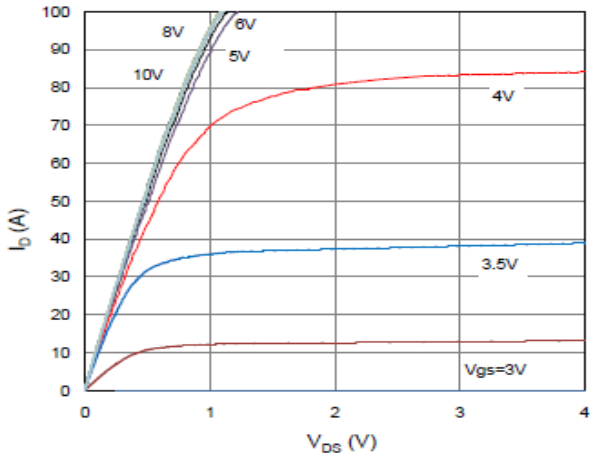


Figure 2. On-Resistance vs. Gate-Source Voltage

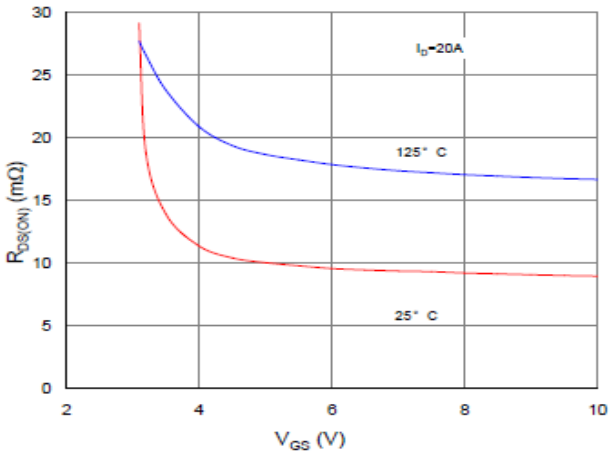


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

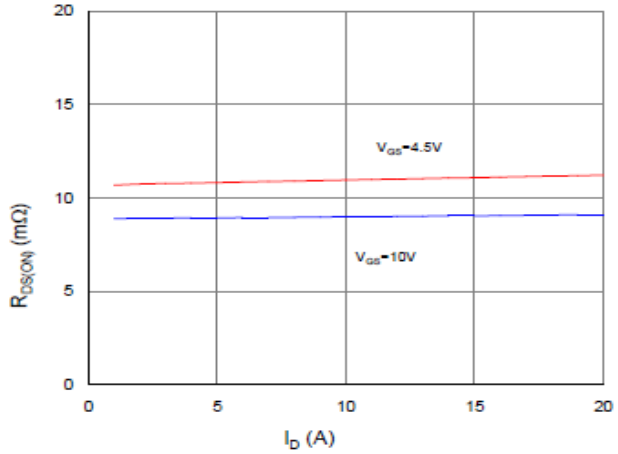


Figure 4. Normalized On-Resistance vs. Junction Temperature

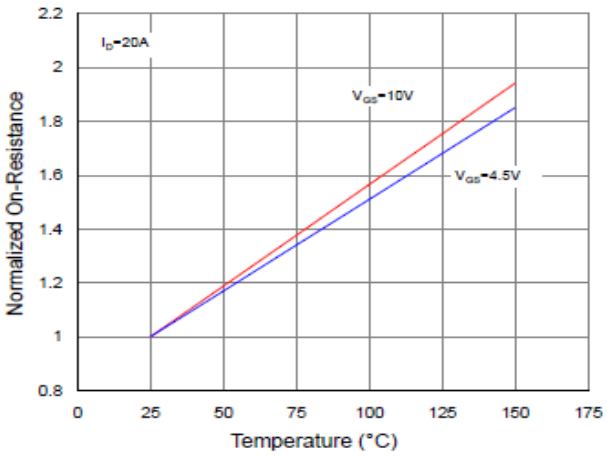


Figure 5. Typical Transfer Characteristics

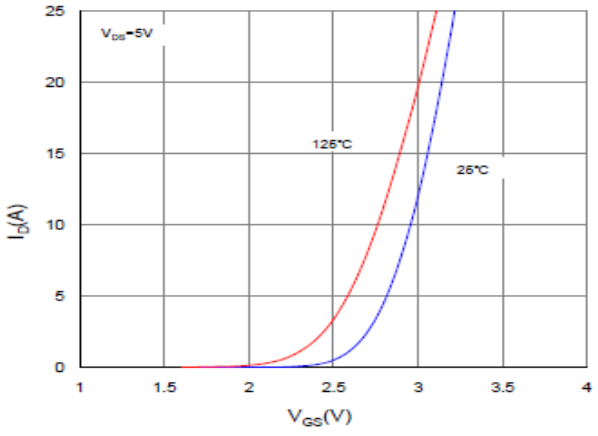
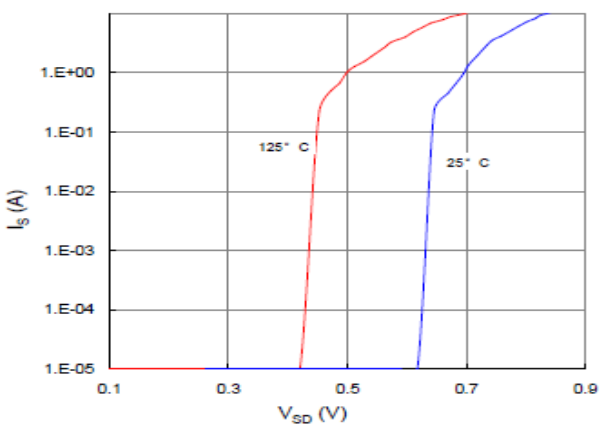


Figure 6. Typical Source-Drain Diode Forward Voltage



TYPICAL CHARACTERISTICS

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

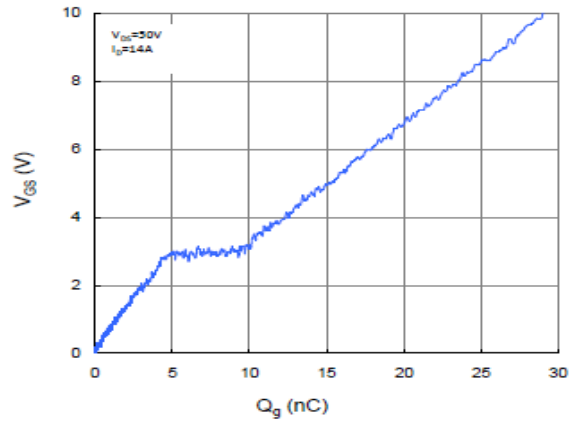


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

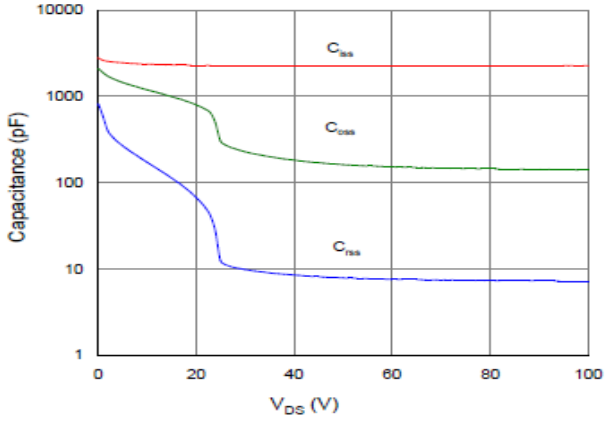


Figure 9. Maximum Safe Operating Area

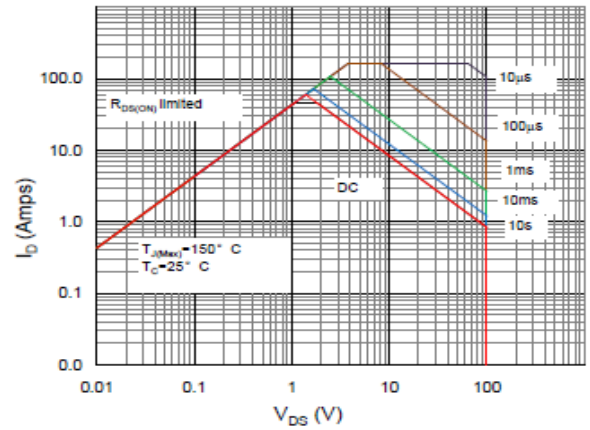


Figure 10. Maximun Drain Current vs. Case Temperature

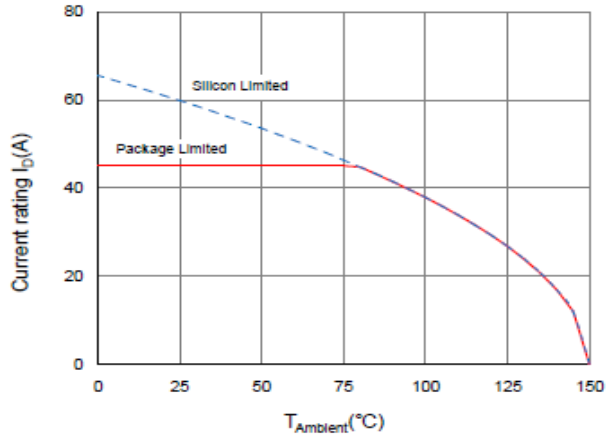
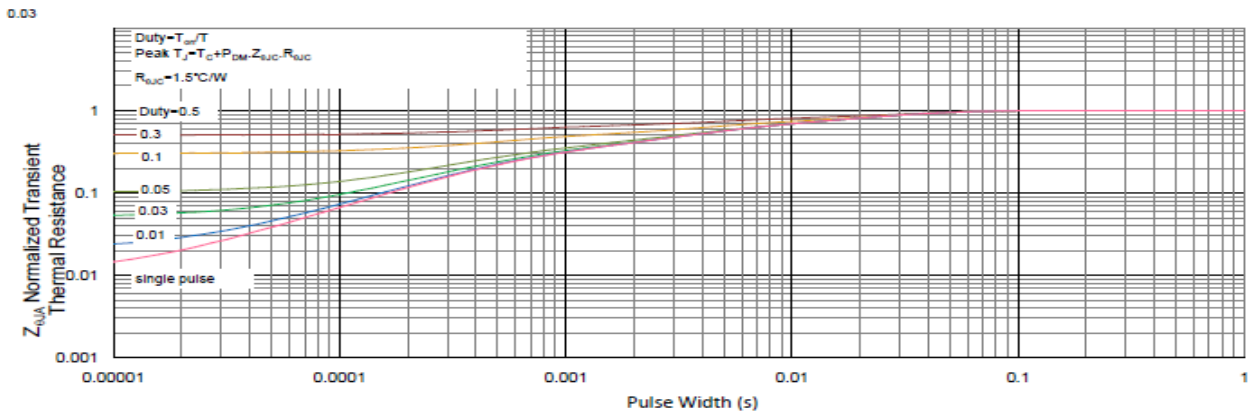
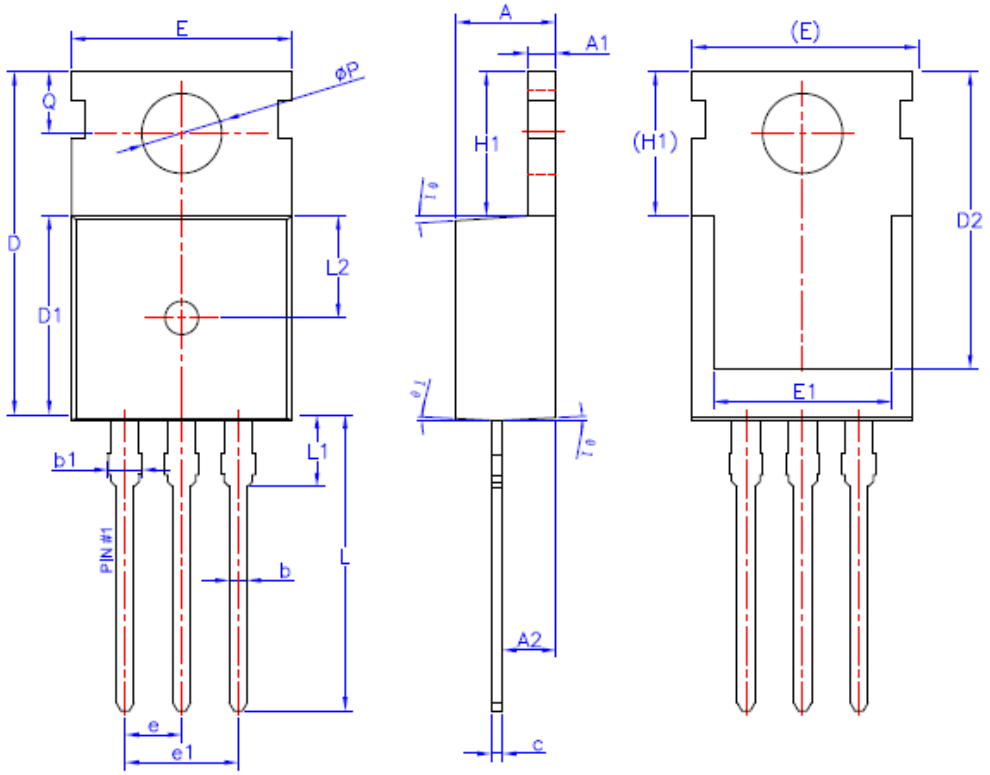


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient

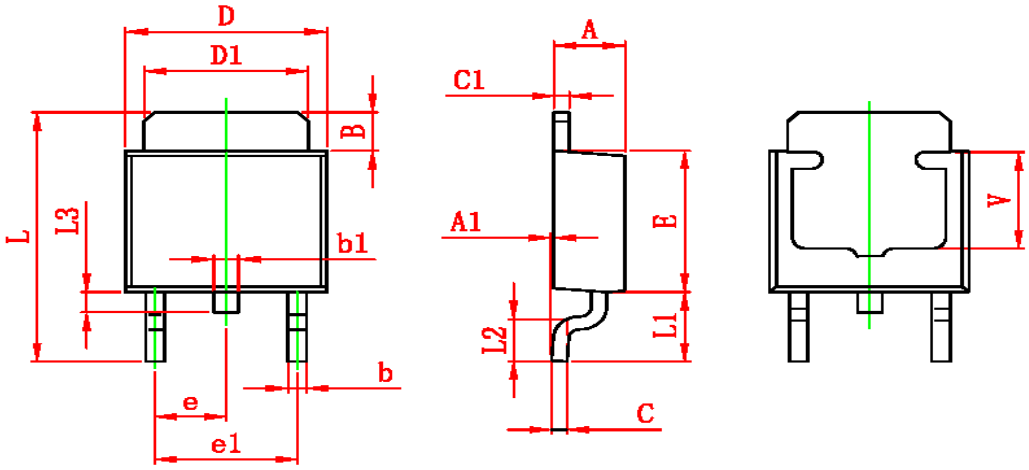


TO-220 PACKAGE OUTLINE



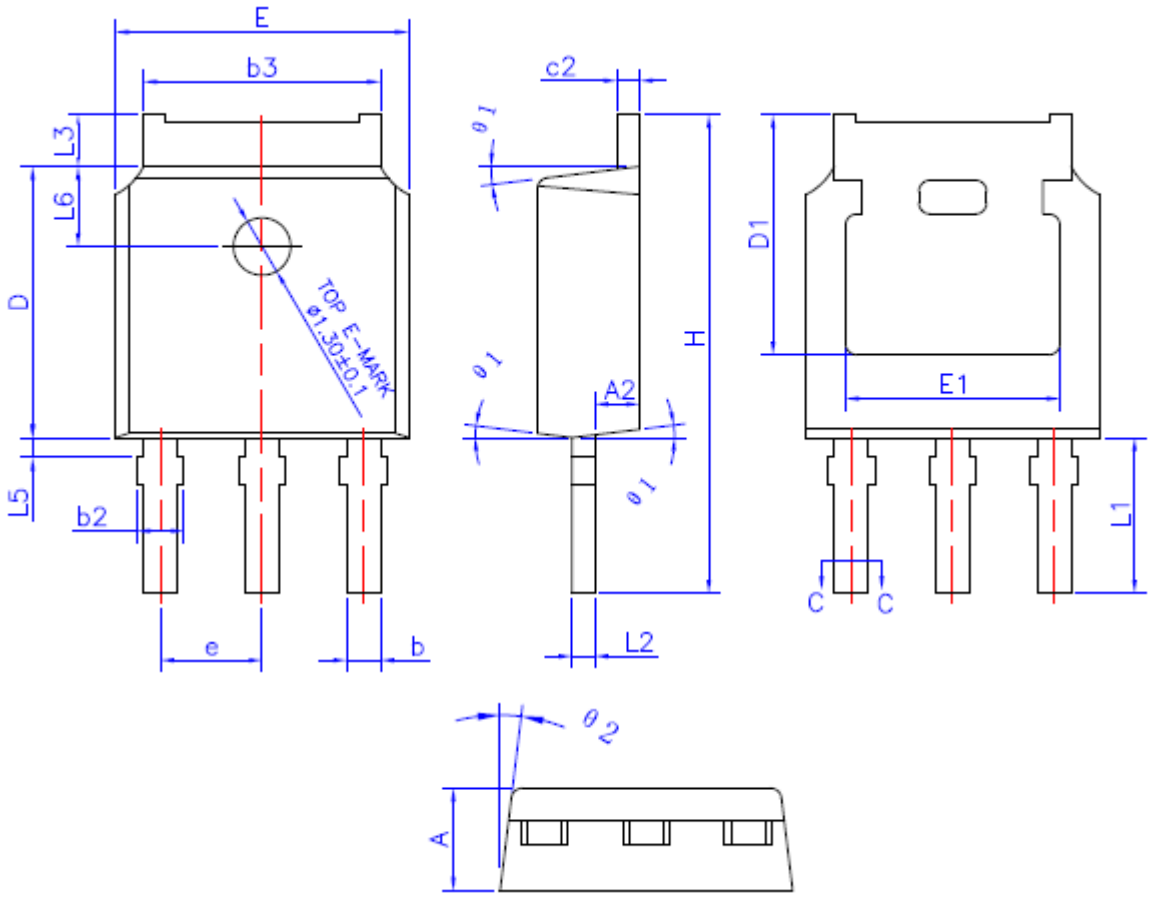
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	–	0.90
b1	1.42	–	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	–	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	–	–	3.50
L2	4.60REF		
ØP	3.55	3.60	3.65
Q	2.73	–	2.87
θ1	1°	3°	5°

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	

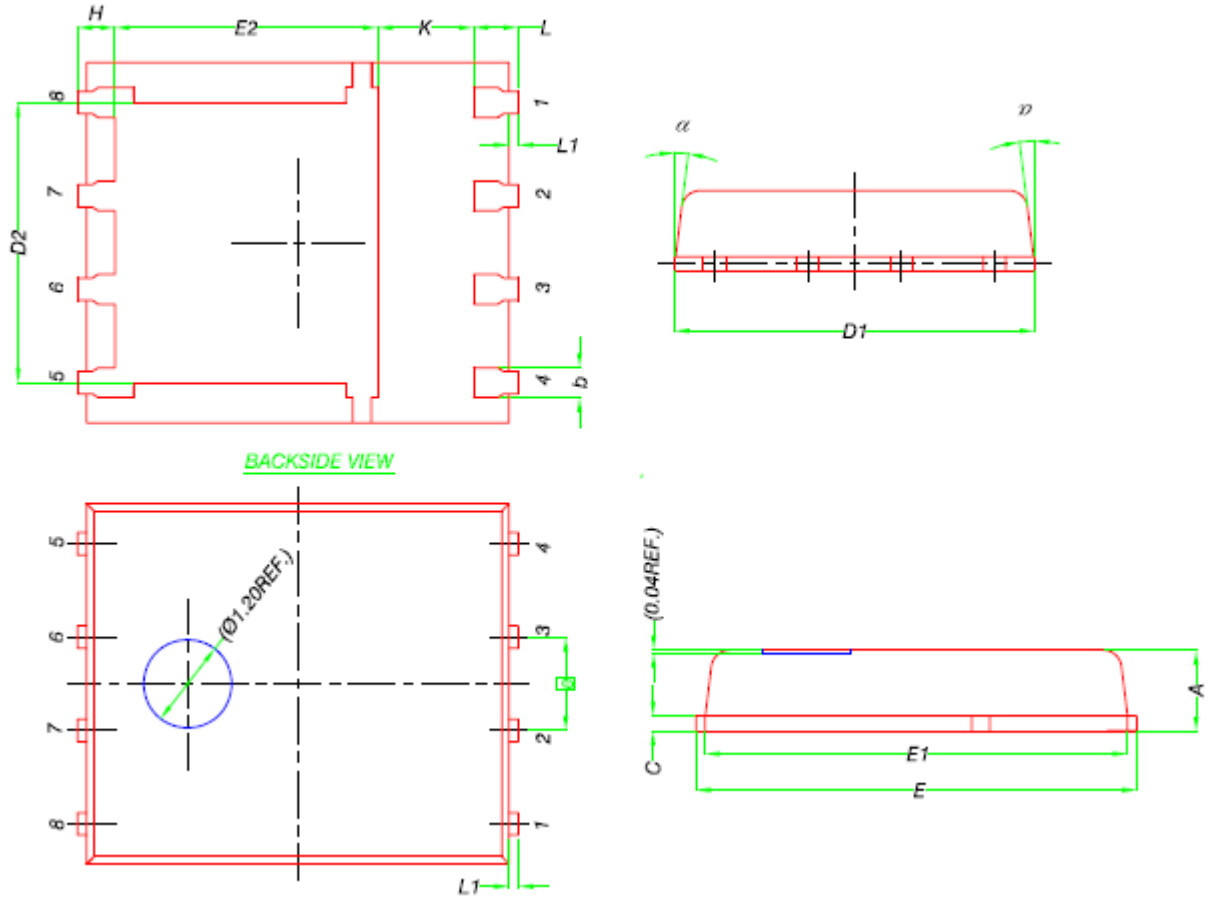
TO-251 PACKAGE OUTLINE



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	
θ1	5°	7°	9°
θ2	5°	7°	9°

PPAK5X6 PACKAGE OUTLINE



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

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