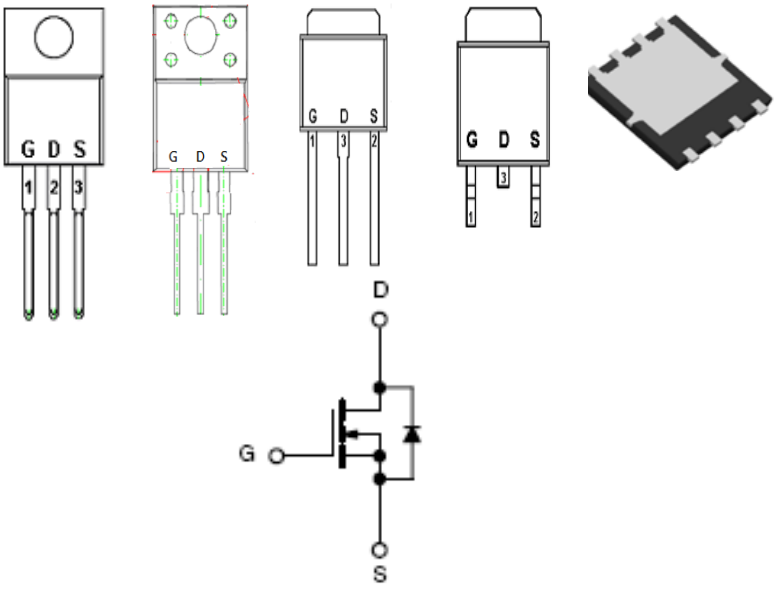
SPN125T06
N-Channel Enhancement Mode MOSFET

DESCRIPTION
The SPN125T06 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 RDS(ON) and fast switching speed.

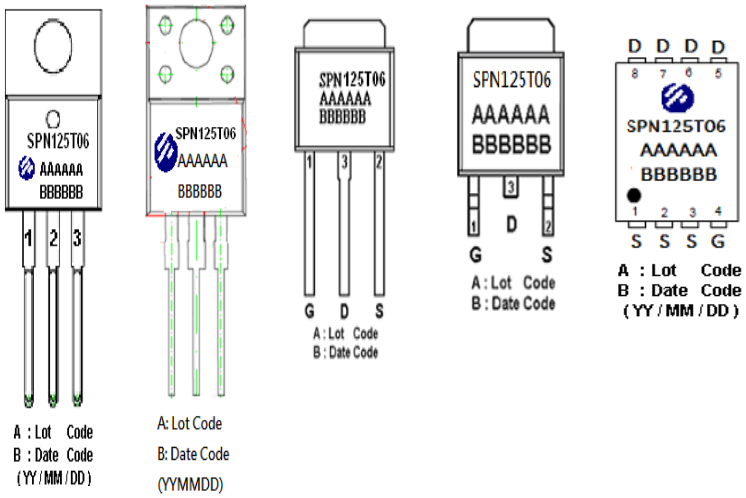
APPLICATIONS
- AC/DC Synchronous Rectifier
- Load Switch
- UPS
- Motor Control
- Power Tool

FEATURES
- 60V/20A,RDS(ON)=4.3mΩ@VGS=10V
  60V/20A,RDS(ON)=5.6mΩ@VGS=4.5V
- Super high density cell design for extremely low RDS (ON)
- Exceptional on-resistance and maximum DC current capability
- TO-220/TO-220F/TO-251/TO-252/PPAK5x6 package design

PIN CONFIGURATION
T O-220 **TO-220F** **TO-251** **TO-252** **PPAK5x6**



PART MARKING



SPN125T06
N-Channel Enhancement Mode MOSFET

T0-220/TO-220F PIN DESCRIPTION

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

TO-251/TO-252 PIN DESCRIPTION

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

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
SPN125T06T220TGB	TO-220	SPN125T06
SPN125T06T220FTGB	TO-220F	SPN125T06
SPN125T06ST251TGB	TO-251	SPN125T06
SPN125T06T252RGB	TO-252	SPN125T06
SPN125T06DN8RGB	PPAK5x6	SPN125T06

※ SPN125T06T220TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN125T06T220FTGB : Tube ; Pb – Free ; Halogen – Free
※ SPN125T06ST251TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN125T06T252TGB : Tape&Reel ; Pb – Free ; Halogen – Free
※ SPN125T06DN8RGB : Tape&Reel ; Pb – Free ; Halogen - Free

SPN125T06
N-Channel Enhancement Mode MOSFET

ABSOULTE MAXIMUM RATINGS

(T_A=25℃ Unless otherwise noted)

Parameter		Symbol	Typical	Unit
Drain-Source Voltage		V_{DSS}	60	V
Gate –Source Voltage		V_{GSS}	±20	V
Continuous Drain Current(TJ=150℃) (TO-220/TO-220F/TO-251/TO-252)	Tc=25℃	I_D	180	A
	Tc=70℃		135	
Continuous Drain Current(TJ=150℃) (PPAK5x6)	Tc=25℃	I_D	125	A
	Tc=100℃		88	
Pulsed Drain Current (TO-220/TO-220F/TO-251/TO-252)		I_{DM}	450	A
Pulsed Drain Current (PPAK5x6)		I_{DM}	410	
Power Dissipation@ Tc=25℃	TO-220/TO-220F	P_D	166	W
Power Dissipation@ Tc=25℃	TO-251/TO-252		83	
Power Dissipation@ Tc=25℃	PPAK5x6		72	
Avalanche Energy with Single Pulse (T_C=25℃, L = 0.1mH.) (TO-220/TO-220F/TO-251/TO-252)		EAS	180	mJ
Avalanche Energy with Single Pulse (T_C=25℃, L = 0.1mH.) (PPAK5x6)			211	
Operating Junction Temperature		T_J	-55/150	℃
Storage Temperature Range		T_{STG}	-55/150	℃
Thermal Resistance-Junction to Case (TO-220/TO-220F)		$R_{\theta JC}$	1.2	℃/W
Thermal Resistance-Junction to Case (TO-251/TO-252)		$R_{\theta JC}$	1.35	℃/W
Thermal Resistance-Junction to Case (PPAK5x6)		$R_{\theta JC}$	1.5	℃/W

ELECTRICAL CHARACTERISTICS

(T_A=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=250uA	60			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	1.0		2.0	
Gate Leakage Current	I_{GSS}	V_{DS}=0V,V_{GS}=±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V T_J = 25 ℃			1	uA
		V_{DS}=60V, V_{GS}=0V T_J = 100 ℃			100	
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS}= 10V,I_D=20A		3.6	4.3	mΩ
		V_{GS}= 4.5V,I_D=20A		4.5	5.6	
Forward Transconductance	gfs	V_{DS}=5V,I_D=20A		75		S
Diode Forward Voltage	V_{SD}	I_S=20A ,V_{GS} =0V			1.2	V
Dynamic						
Total Gate Charge (10V)	Q_g	V_{DS}=30V, V_{GS}=10V I_D = 20A		54		nC
Total Gate Charge (4.5V)	Q_g			27		
Gate-Source Charge	Q_{gs}			14		
Gate-Drain Charge	Q_{gd}			6		
Input Capacitance	C_{iss}	V_{DS}=30V, V_{GS}=0V f=1MHz		3800		pF
Output Capacitance	C_{oss}			520		
Reverse Transfer Capacitance	C_{rss}			50		
Turn-On Time	td(on)	V_{DD}=30V, I_D=20A V_{GEN}=10V, R_G=10Ω		16		nS
	tr			36		
Turn-Off Time	td(off)			55		
	tf			35		

TYPICAL CHARACTERISTICS

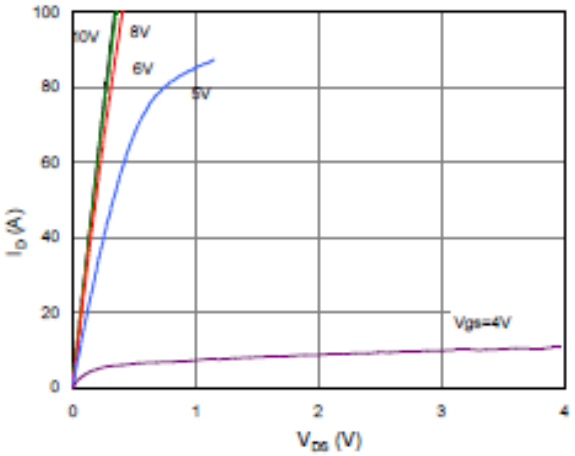


Fig. 1 Output Characteristics

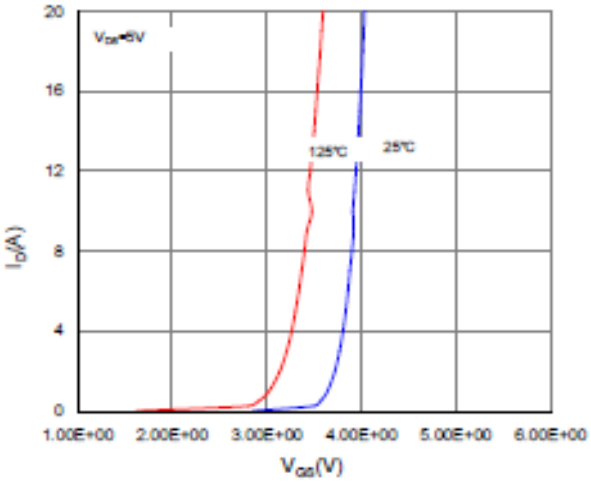


Fig. 2 Transfer Characteristics

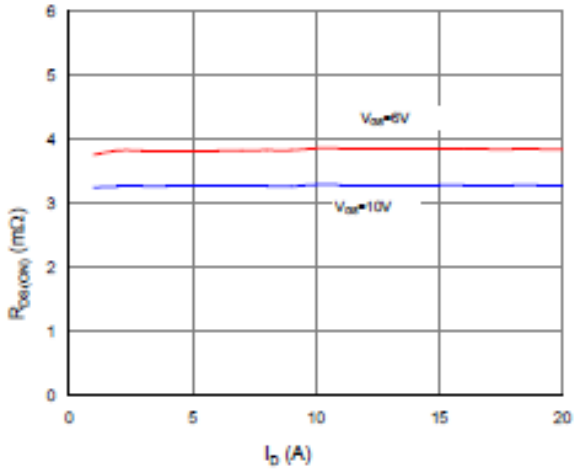


Fig. 3 On Resistances vs Drain Current

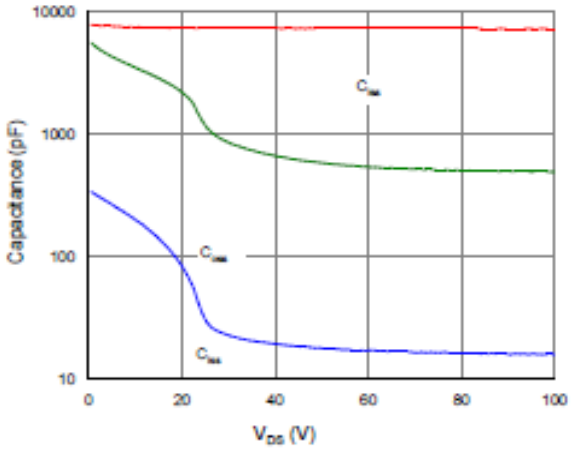


Fig. 4 Capacitance

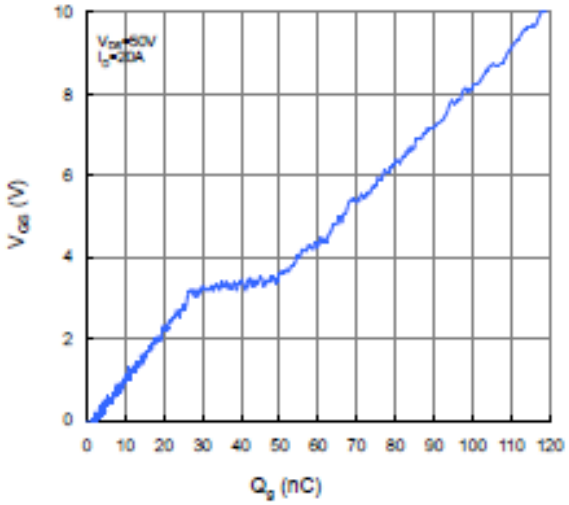


Fig. 5 Gate Charge

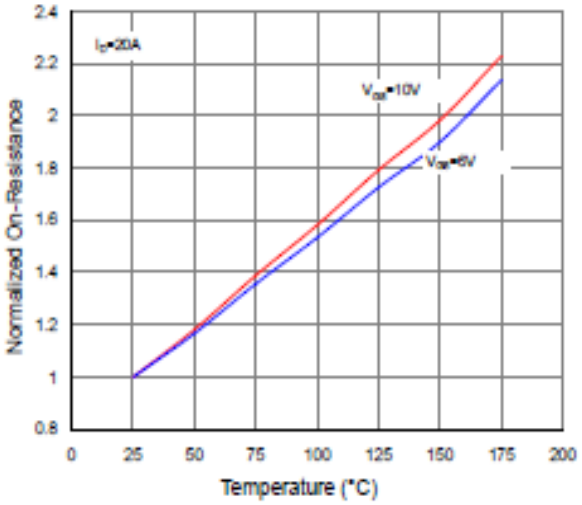


Fig. 6 On- Resistance vs Junction Temperature

TYPICAL CHARACTERISTICS

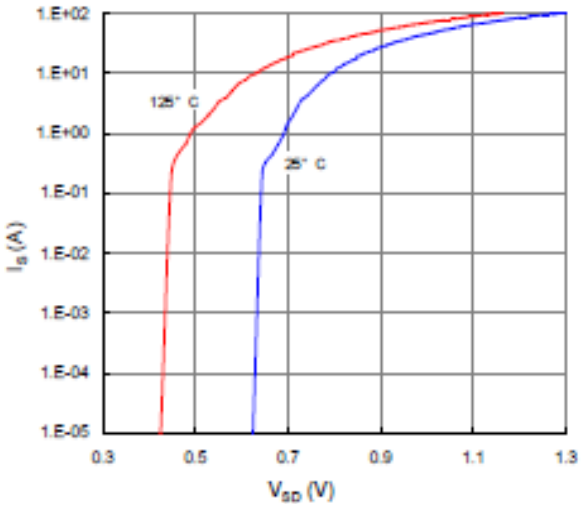


Fig. 7 Source Drain Diode Forward Voltage

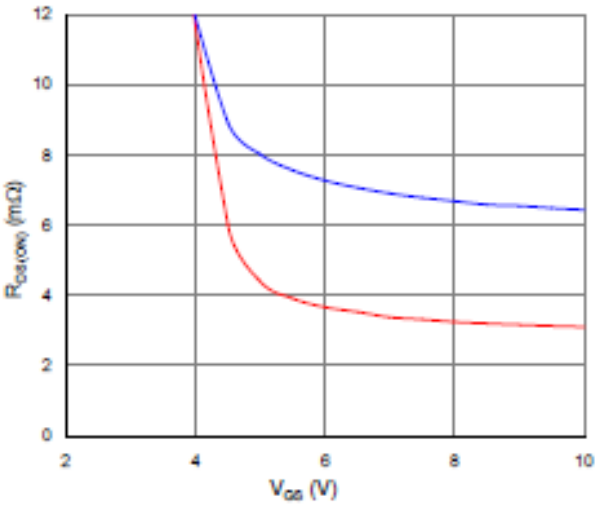


Fig. 8 On Resistance vs Gate Source Voltage

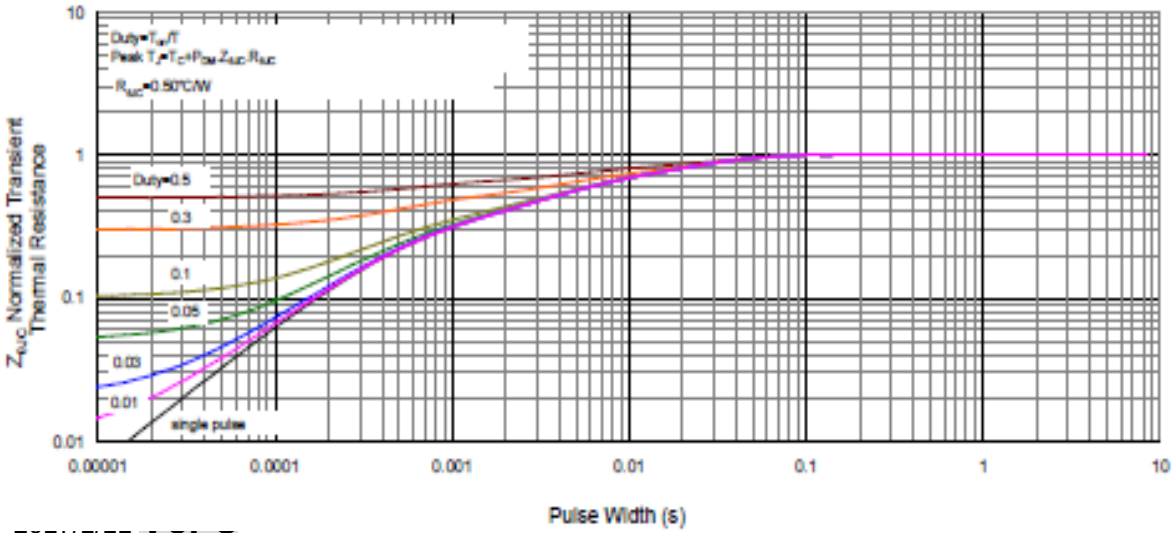
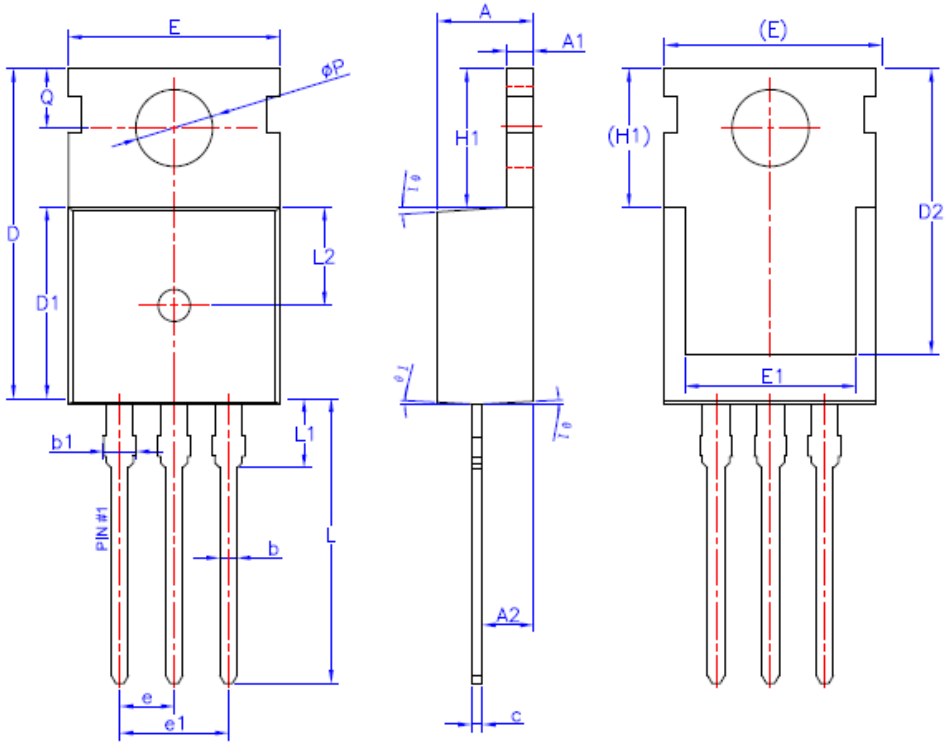


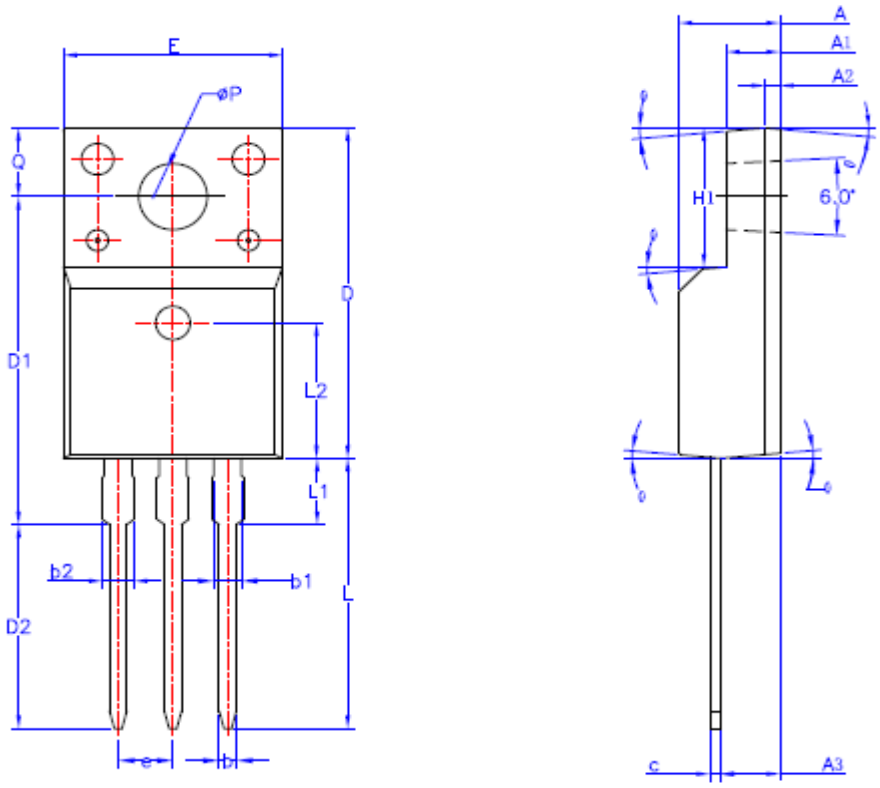
Fig. 9 Normalized Thermal Transient Impedance, Junction to Foot

TO-220-3L PACKAGE OUTLINE



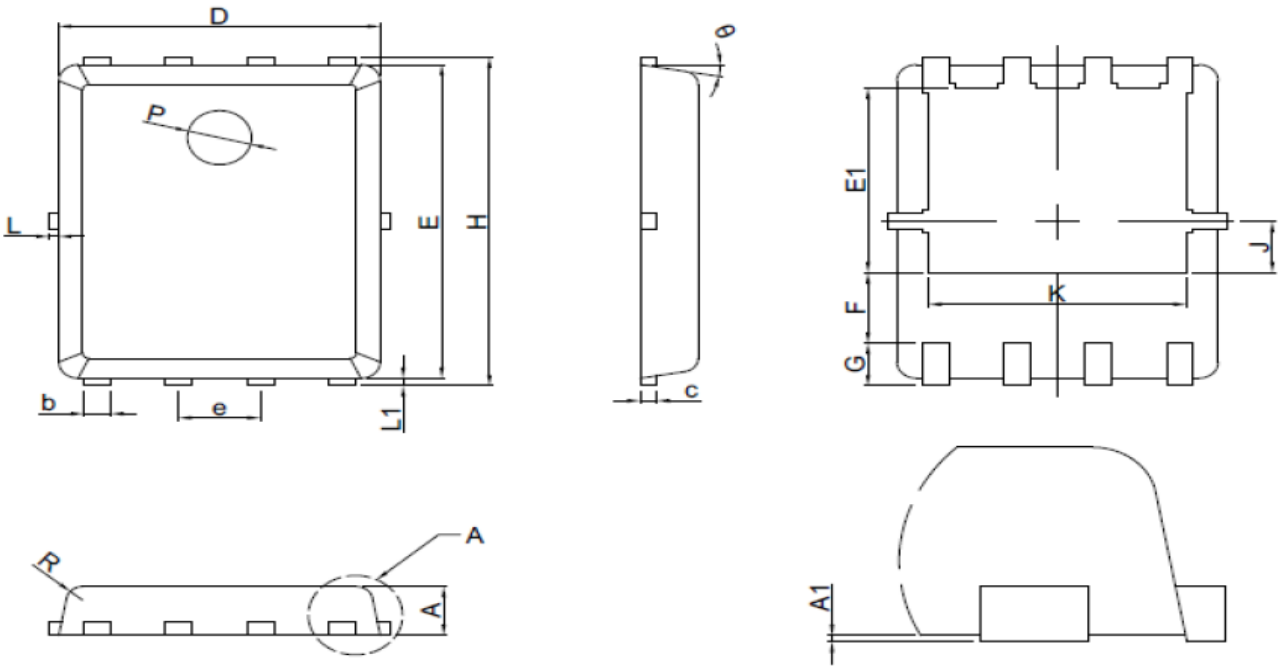
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	–	0.90
b1	1.42	–	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	–	13.70
E	9.70	9.90	10.20

TO-220F-3L PACKAGE OUTLINE



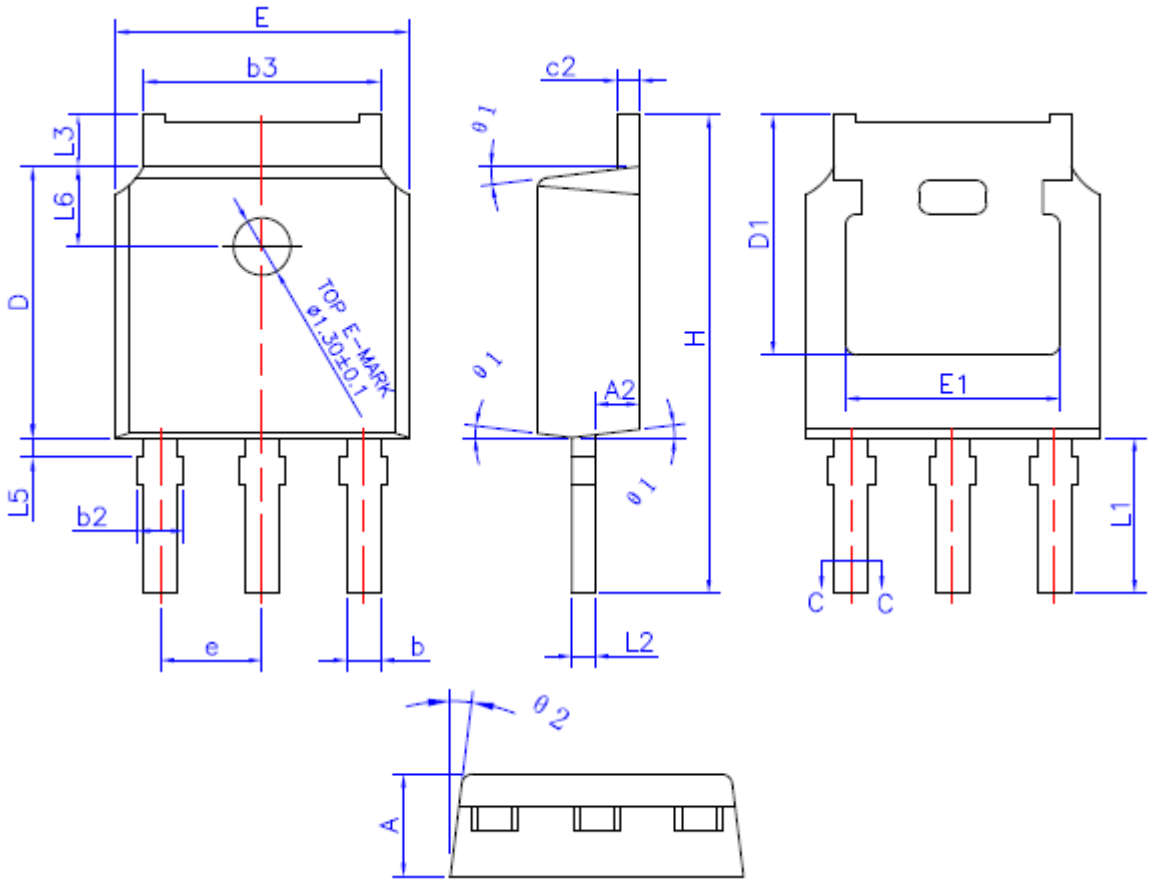
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2		0.70 REF	
A3	2.56	2.76	2.93
b	0.70	–	0.90
b1	1.18	–	1.38
b2	–	–	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e		2.54BSC	
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	–	–	3.50
L2		6.50REF	
øP	3.08	3.18	3.28
Q	3.20	–	3.40
θ1	1°	3°	5°

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	

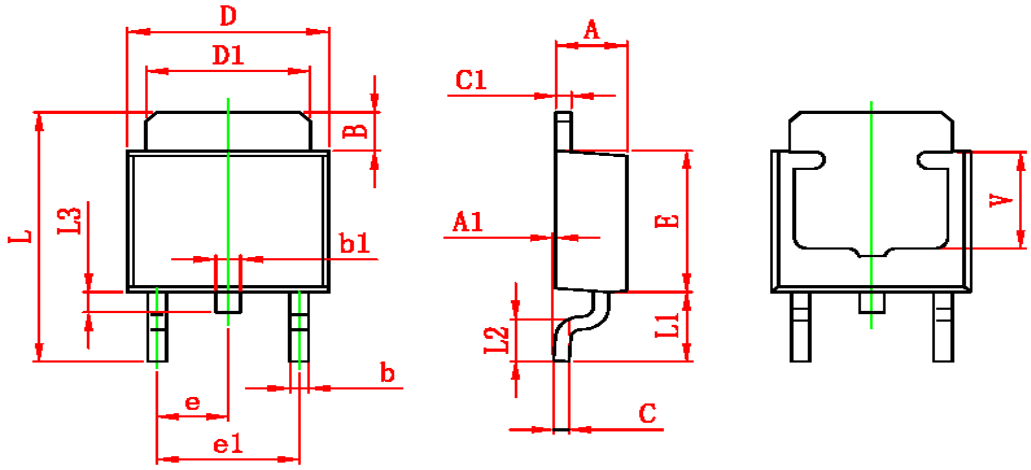
TO-251 PACKAGE OUTLINE



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°

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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