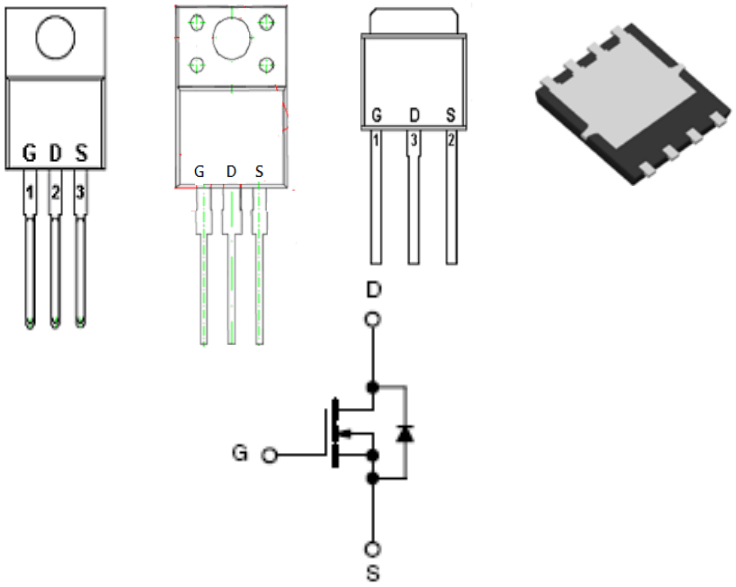
SPN125T06
N-Channel Enhancement Mode MOSFET

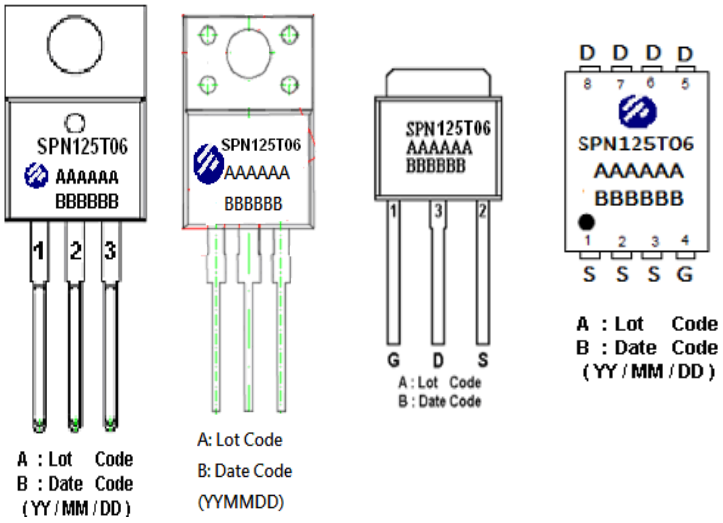
DESCRIPTION
The SPN125T06 is the N-Channel logic enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier application, Motor control power management and other Power Tool circuits. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

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

FEATURES
- 60V/125A,$R_{DS(ON)}$=4.3mΩ@V_{GS}=10V
  $R_{DS(ON)}$=5.6mΩ@V_{GS}=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/PPAK5x6 package design

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



PART MARKING


SPN125T06
N-Channel Enhancement Mode MOSFET

T0-220/TO-220F/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
SPN125T06T220TGB	TO-220	SPN125T06
SPN125T06T220FTGB	TO-220F	SPN125T06
SPN125T06ST251TGB	TO-251	SPN125T06
SPN125T06DN8RGB	PPAK5x6	SPN125T06

※ SPN125T06T220TGB : Tube ; Pb – Free ; Halogen – Free
※ SPN125T06T220FTGB : Tube ; Pb – Free ; Halogen – Free
※ SPN125T06ST251TGB : Tube ; 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)	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)		I_{DM}	450	A
Pulsed Drain Current (PPAK5x6)		I_{DM}	410	
Power Dissipation@ Tc=25℃	TO-220/TO-220F	P_D	166	W
	TO-251/PPAK5x6		83	
Avalanche Energy with Single Pulse (T_C=25℃, L = 0.1mH.) (TO-220/TO-220F/TO-251)		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)		$R_{\theta JC}$	1.35	℃/W
Thermal Resistance-Junction to Case (PPAK5x6)		$R_{\theta JC}$	1.5	℃/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	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

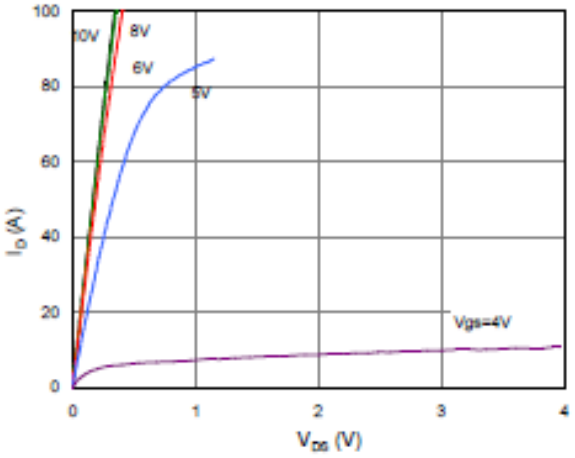


Fig. 1 Output Characteristics

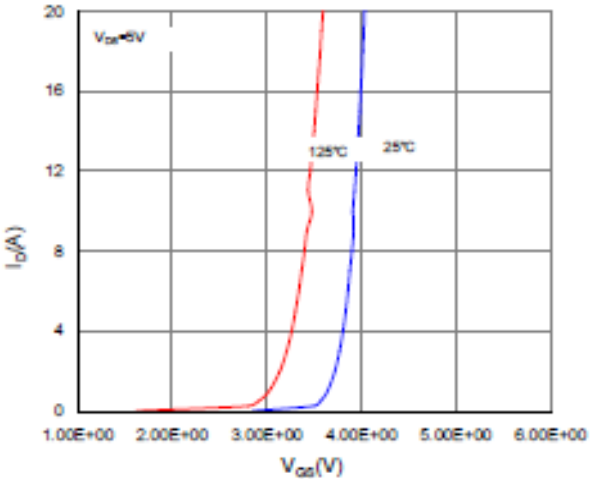


Fig. 2 Transfer Characteristics

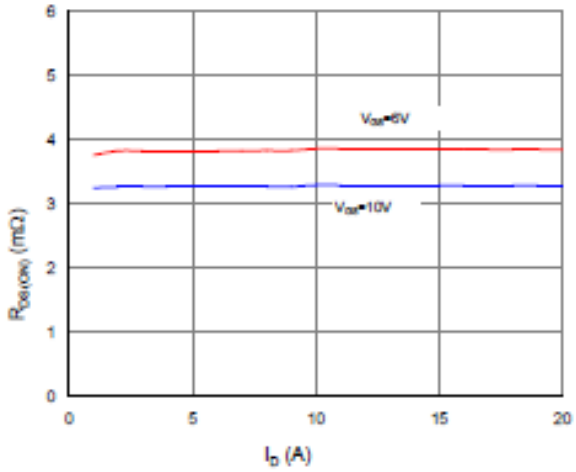


Fig. 3 On Resistances vs Drain Current

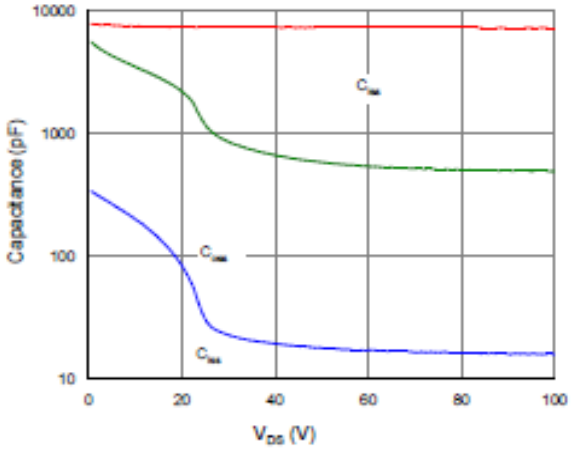


Fig. 4 Capacitance

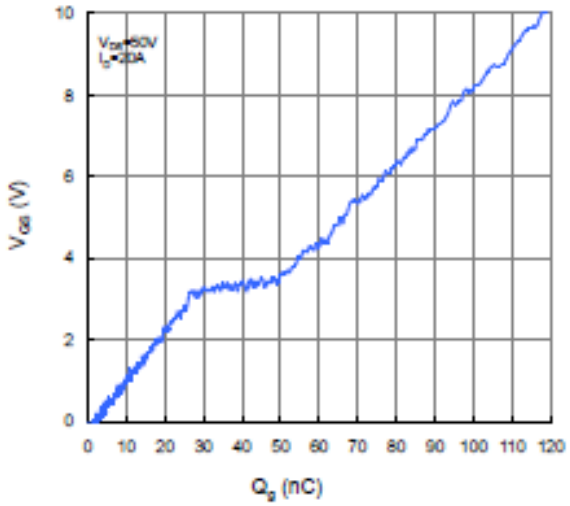


Fig. 5 Gate Charge

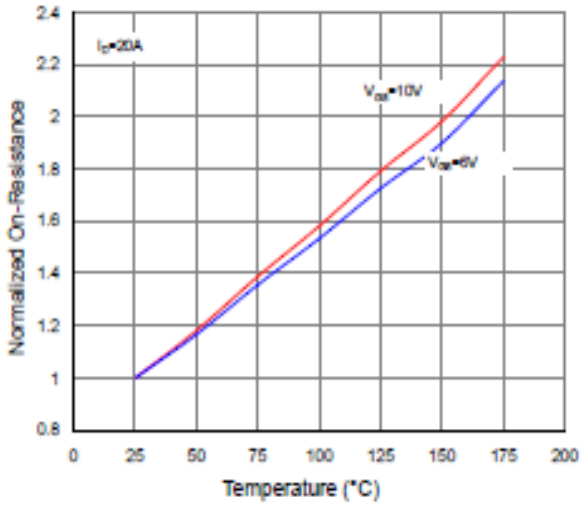


Fig. 6 On- Resistance vs Junction Temperature

TYPICAL CHARACTERISTICS

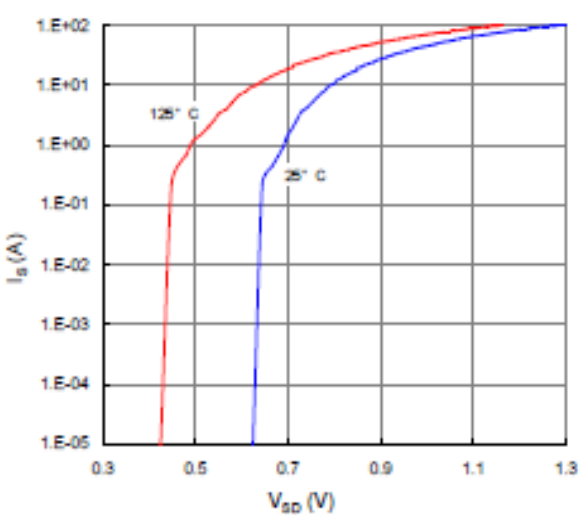


Fig. 7 Source Drain Diode Forward Voltage

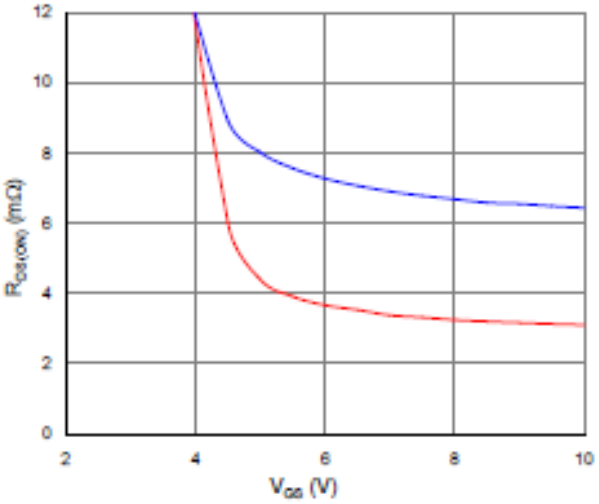


Fig. 8 On Resistance vs Gate Source Voltage

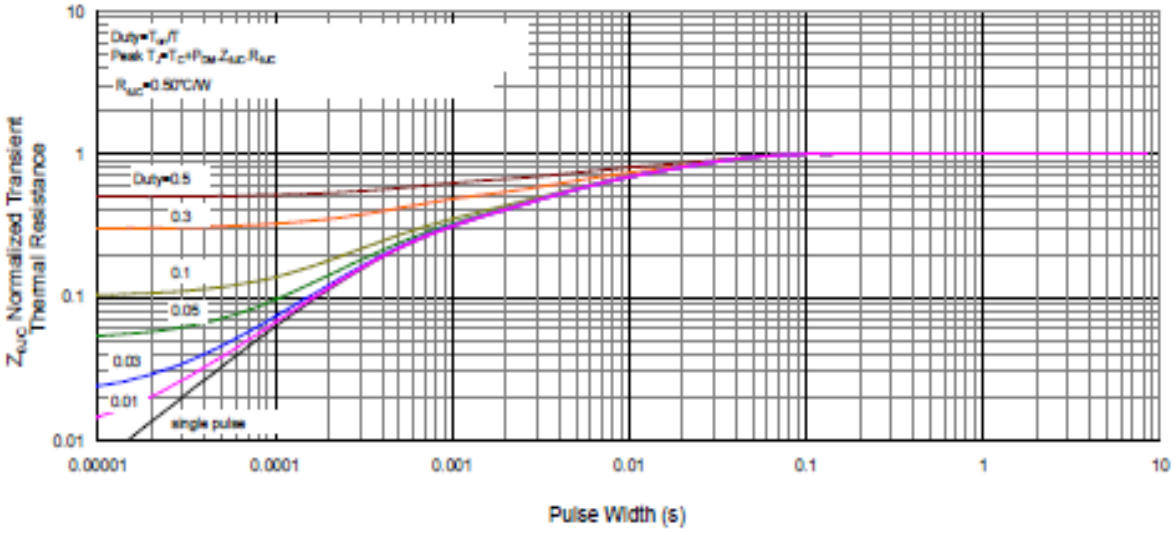
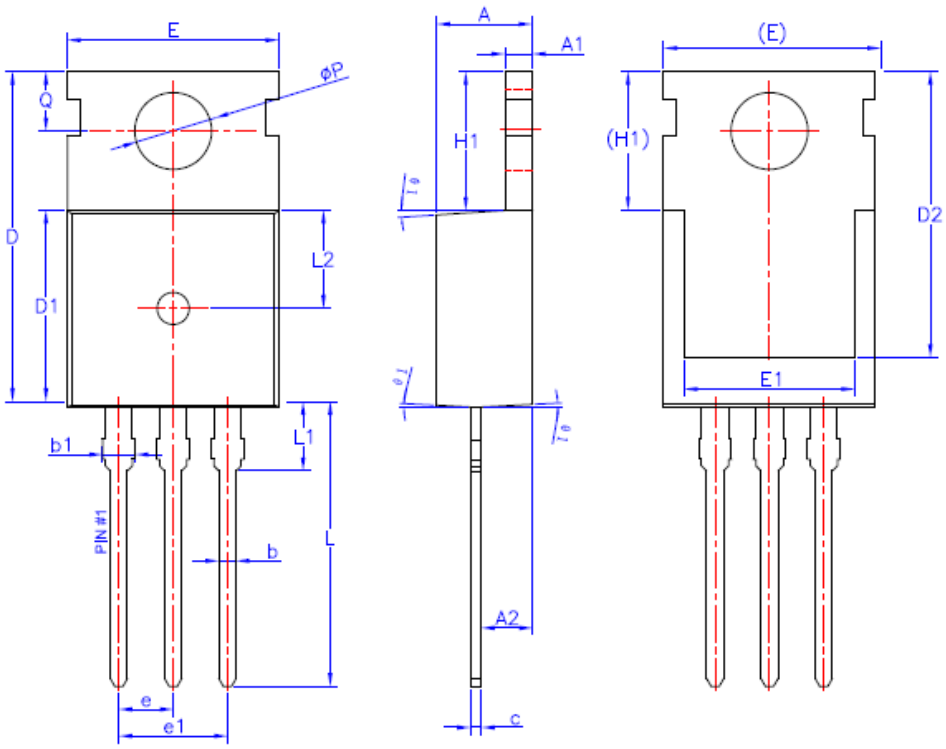


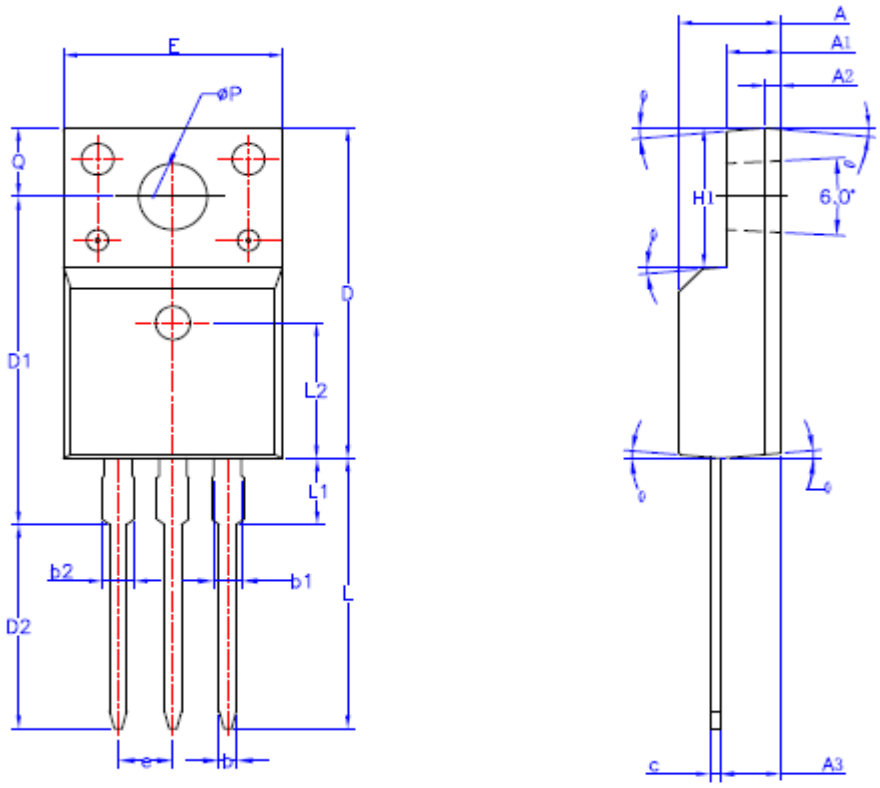
Fig. 9 Normalized Thermal Transient Impedance, Junction to Foot

TO-220-3L PACKAGE OUTLINE



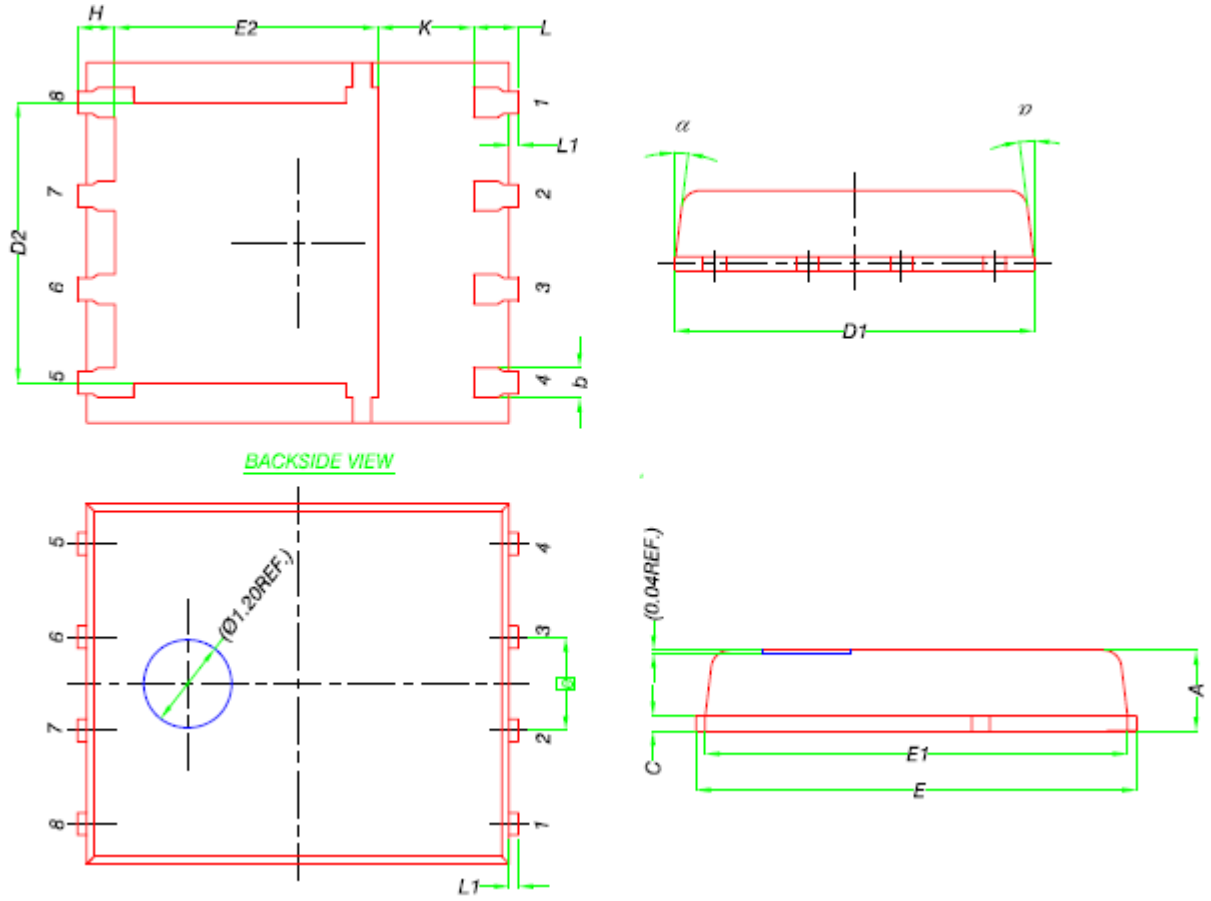
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	–	0.90
b1	1.42	–	1.57
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	–	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	–	–	3.50
L2	4.60REF		
ØP	3.55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

TO-220F-3L PACKAGE OUTLINE



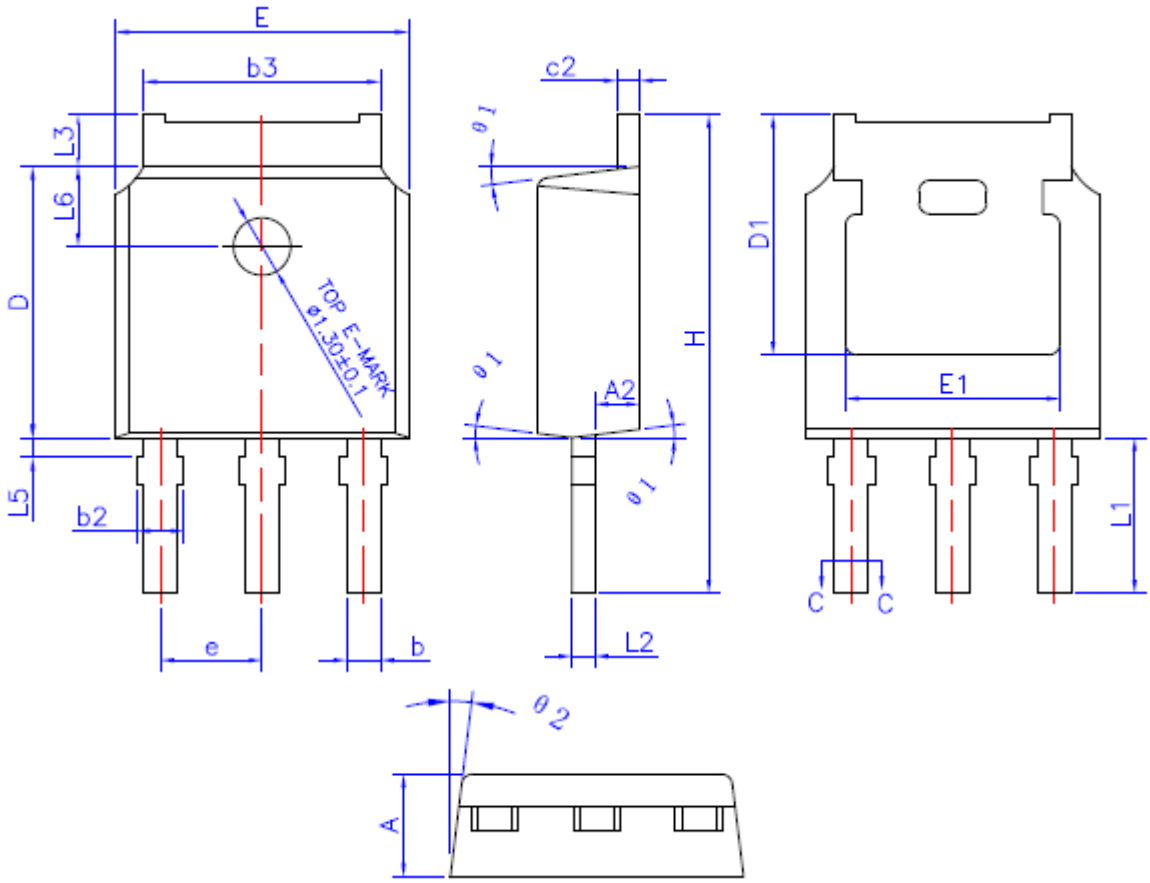
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2		0.70 REF	
A3	2.56	2.76	2.93
b	0.70	–	0.90
b1	1.18	–	1.38
b2	–	–	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.0
E	9.96	10.16	10.36
e		2.54BSC	
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	–	–	3.50
L2		6.50REF	
øP	3.08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

PPAK5x6 PACKAGE OUTLINE



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°

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°

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