



SPN80T10

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN80T10 is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. The SPN80T10 has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. 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

- ◆ 100V/100A, $R_{DS(ON)}=8.2m\Omega@V_{GS}=10V$
- ◆ High density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L/TO-251S-3L/TO-252-2L/TO-263-2L /PPAK5x6-8L package design

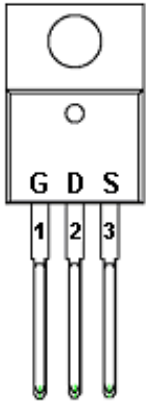


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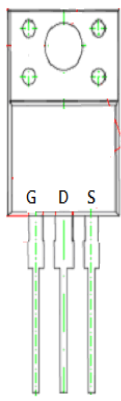
N-Channel Enhancement Mode MOSFET

PIN CONFIGURATION

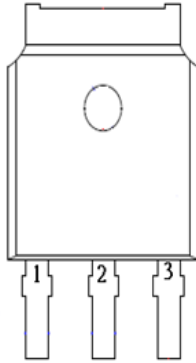
TO-220



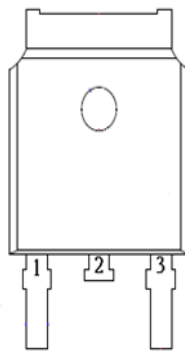
TO-220F



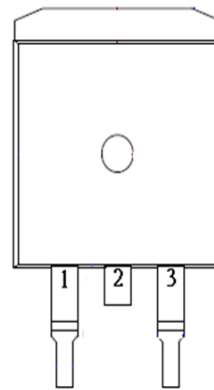
TO-251S-3L



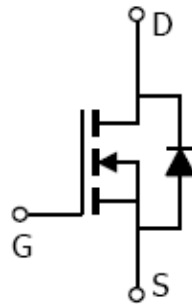
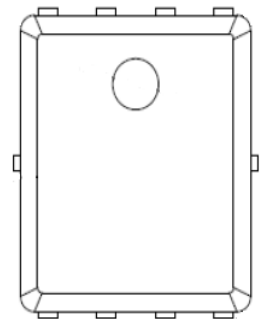
TO-252-2L



TO-263-2L



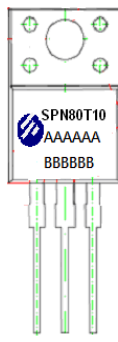
PPAK5x6



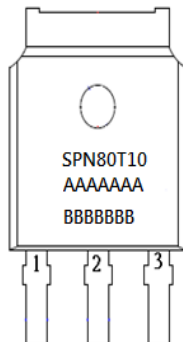
PART MARKING



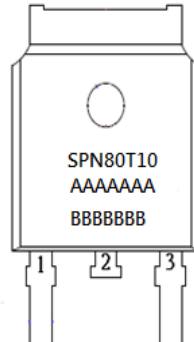
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B : Date Code
(YY/MM/DD)



A: Lot Code
B: Date Code
(YYMMDD)



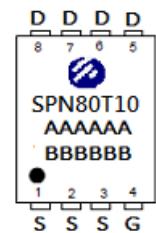
A : Lot Code
B : Date Code



A : Lot Code
B : Date Code



AAAAA: Wafer lot no
BBBBBB : date code



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



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N-Channel Enhancement Mode MOSFET

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
SPN80T10T220TGB	TO-220-3L	SPN80T10
SPN80T10T220FTGB	TO-220F-3L	SPN80T10
SPN80T10ST251TGB	TO-251S-3L	SPN80T10
SPN80T10T252RGB	TO-252-2L	SPN80T10
SPN80T10T262RGB	TO-263-2L	SPN80T10
SPN80T10DN8RGB	PPAK5x6-8L	SPN80T10

- ※ SPN80T10T220TGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN80T10T220FTGB : Tube ; Pb – Free ; Halogen – Free
- ※ SPN80T10ST251TGB : Tube ; Pb – Free ; Halogen - Free
- ※ SPN80T10T252RGB : Tape Reel ; Pb – Free ; Halogen – Free
- ※ SPN80T10T262RGB : Tape Reel ; Pb – Free ; Halogen – Free
- ※ SPN80T10DN8RGB : 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}	100	V
Gate –Source Voltage		V _{GSS}	±20	V
Continuous Drain Current(Silicon Limited)	Tc=25°C	I _D	100	A
	Tc=70°C		71	
Continuous Drain Current(Silicon Limited) (PPAK5x6)	Tc=25°C	I _D	85	A
	Tc=70°C		60	
Pulsed Drain Current		I _{DM}	390	A
Power Dissipation@ Tc=25°C	TO-220/TO-263	P _D	104	W
Power Dissipation@ Tc=25°C	TO-251S/TO-252/TO-220F		93	
Power Dissipation@ Tc=25°C	PPAK5x6		83	
Avalanche Energy with Single Pulse (Tc=25°C , L =0.1mH)		EAS	518	mJ
Operating Junction Temperature		T _J	-55/150	°C
Storage Temperature Range		T _{STG}	-55/150	°C
Thermal Resistance-Junction to Case (TO-220/TO-220F/TO-263)		R _{θJC}	1.2	°C/W
Thermal Resistance-Junction to Case (TO-251S/TO-252)		R _{θJC}	1.35	°C/W
Thermal Resistance-Junction to Case (PPAK5x6)		R _{θJC}	1.5	°C/W

Note :

The maximum current rating is package limited at 120A for TO-263-2L and TO-220-3L

The maximum current rating is package limited at 78A for TO-220F-3L

The maximum current rating is package limited at 70A for TO-251S-3L and TO-252-2L

The maximum current rating is package limited at 80A for PPAK5x6-8L



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ELECTRICAL CHARACTERISTICS

($T_A=25^{\circ}\text{C}$ 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	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=64V, V_{GS}=0V$ $T_J = 25^{\circ}\text{C}$			1	uA
		$V_{DS}=64V, V_{GS}=0V$ $T_J=100^{\circ}\text{C}$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		6.4	8.2	m Ω
Forward Transconductance	g_{fs}	$V_{DS}=10V, I_D=40A$		75		S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}=\text{Open},$ $f=1\text{MHz}$		1.6		Ω
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$			1.2	V
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=50V, V_{GS}=10V$ $I_D=20A$		56		nC
Gate-Source Charge	Q_{gs}			14		
Gate-Drain Charge	Q_{gd}			18		
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V$ $f=1\text{MHz}$		3600		pF
Output Capacitance	C_{oss}			290		
Reverse Transfer Capacitance	C_{rss}			88		
Turn-On Time	$t_{d(on)}$	$V_{DD}=50V, R_L=1\Omega$ $I_D=20A, V_{GS}=10V$ $R_G=10\Omega$		17		nS
	t_r			40		
Turn-Off Time	$t_{d(off)}$			57		
	t_f			37		



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TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

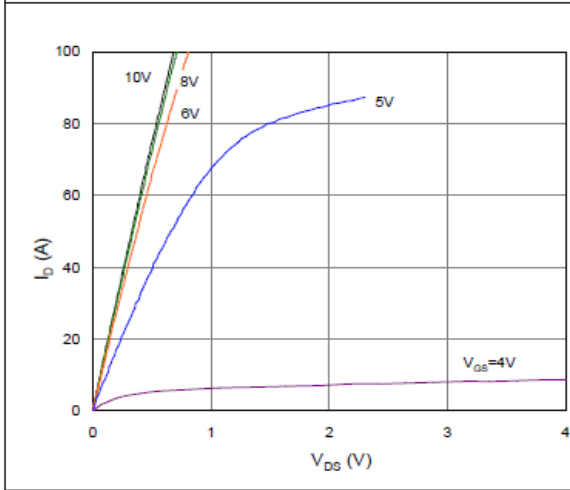


Figure 2. On-Resistance vs. Gate-Source Voltage

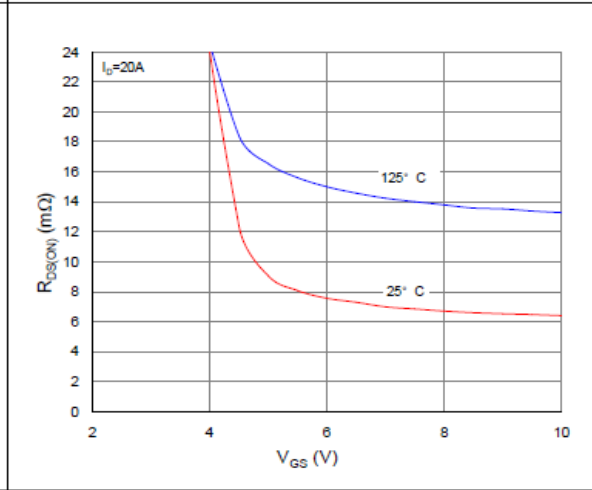


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

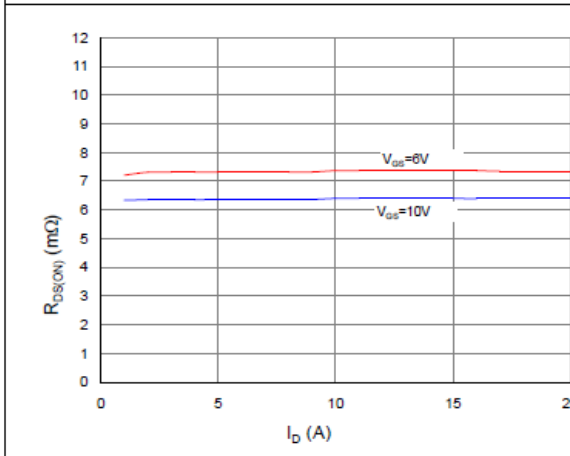


Figure 4. Normalized On-Resistance vs. Junction Temperature

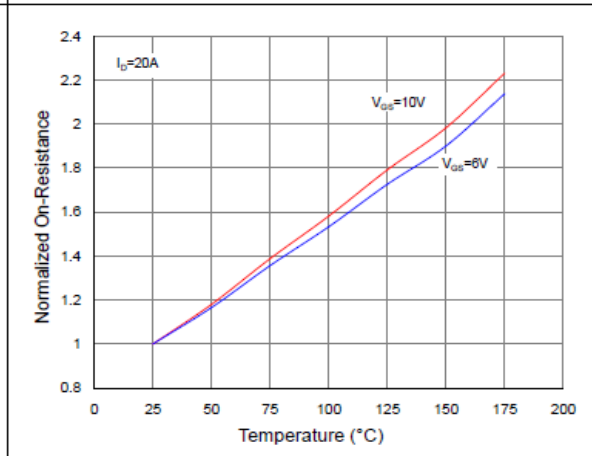


Figure 5. Typical Transfer Characteristics

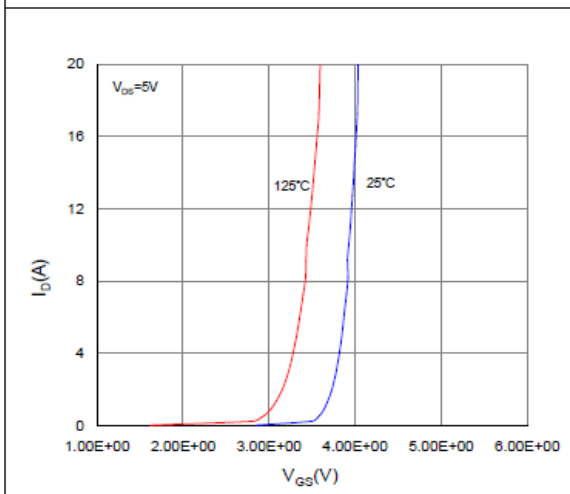
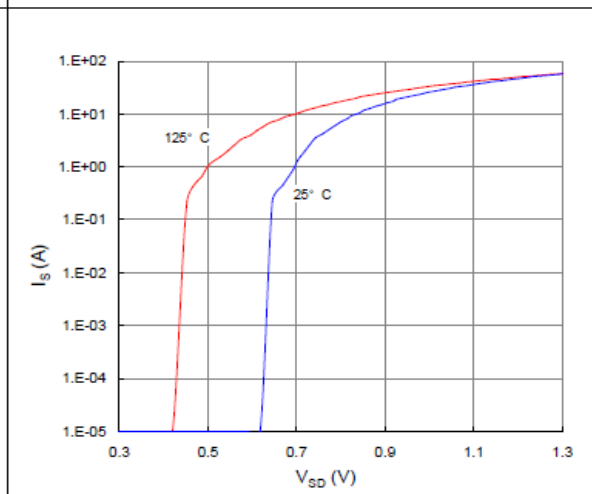


Figure 6. Typical Source-Drain Diode Forward Voltage





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TYPICAL CHARACTERISTICS

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

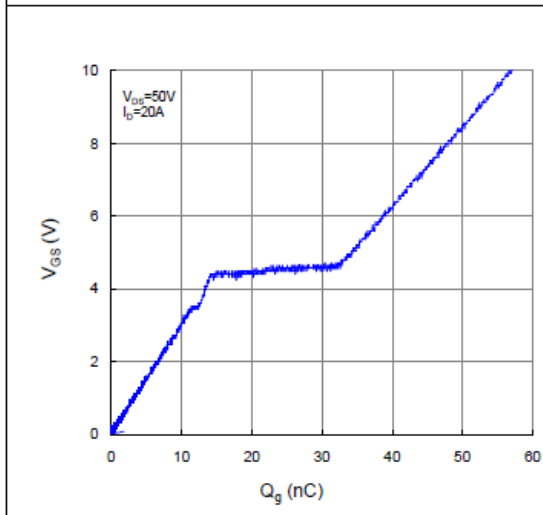


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

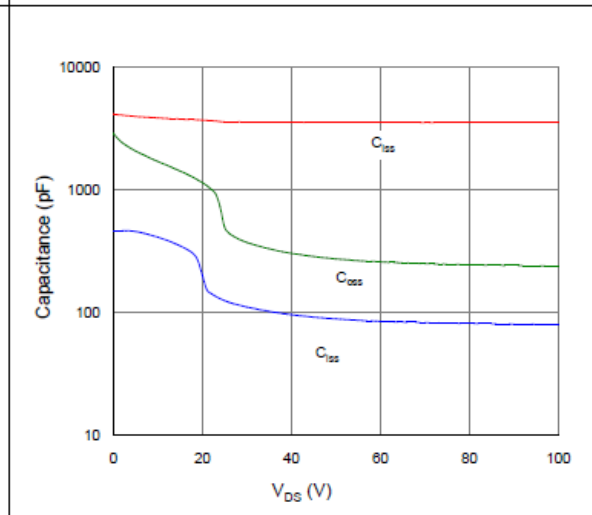


Figure 9. Maximum Safe Operating Area

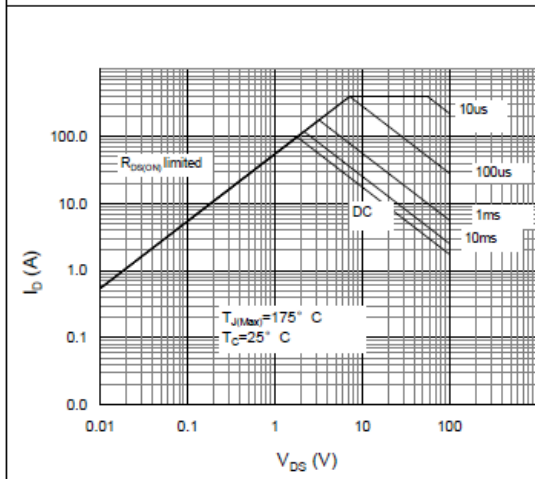


Figure 10. Maximum Drain Current vs. Case Temperature

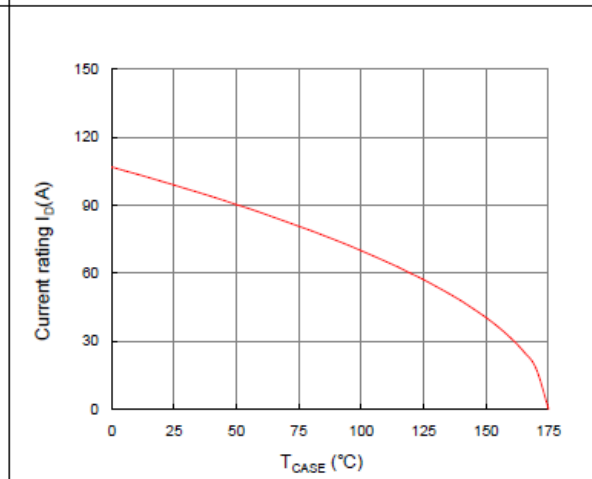
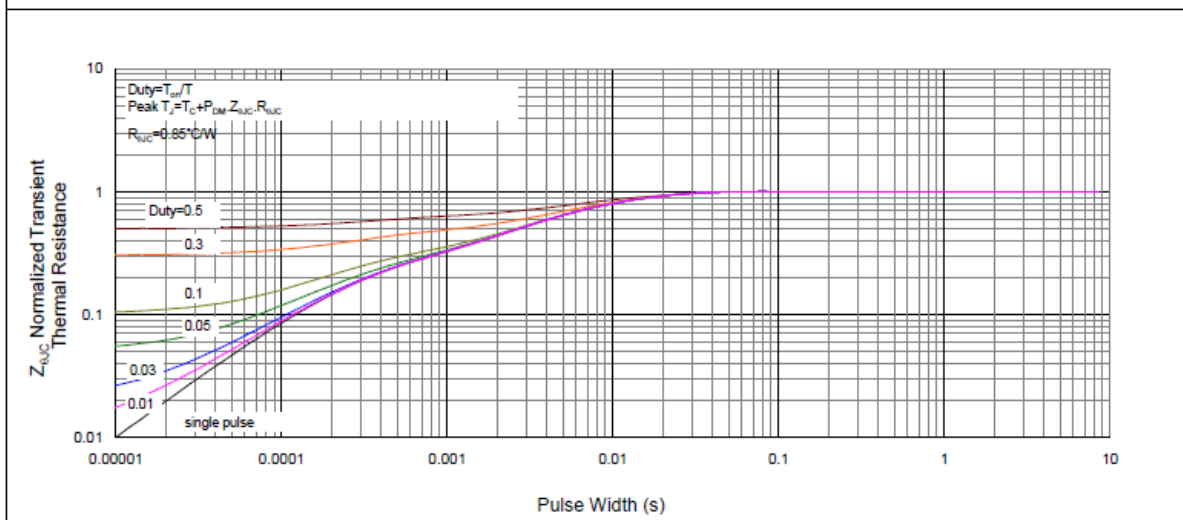


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

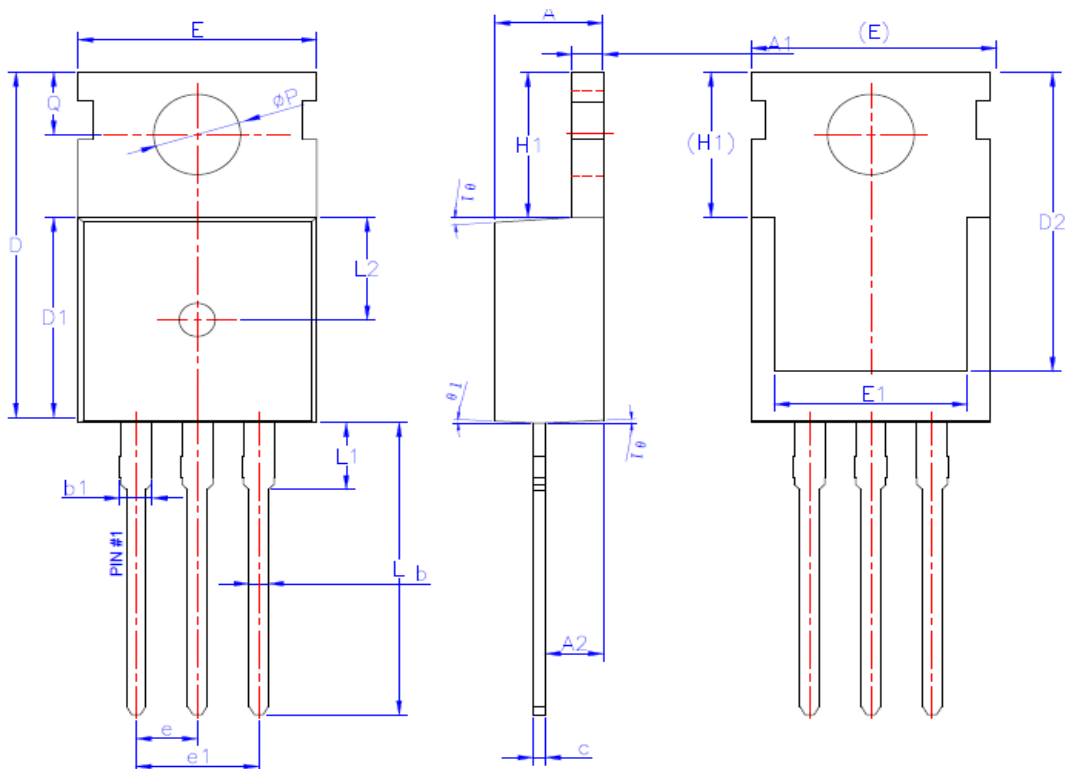




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TO-220-3L PACKAGE OUTLINE



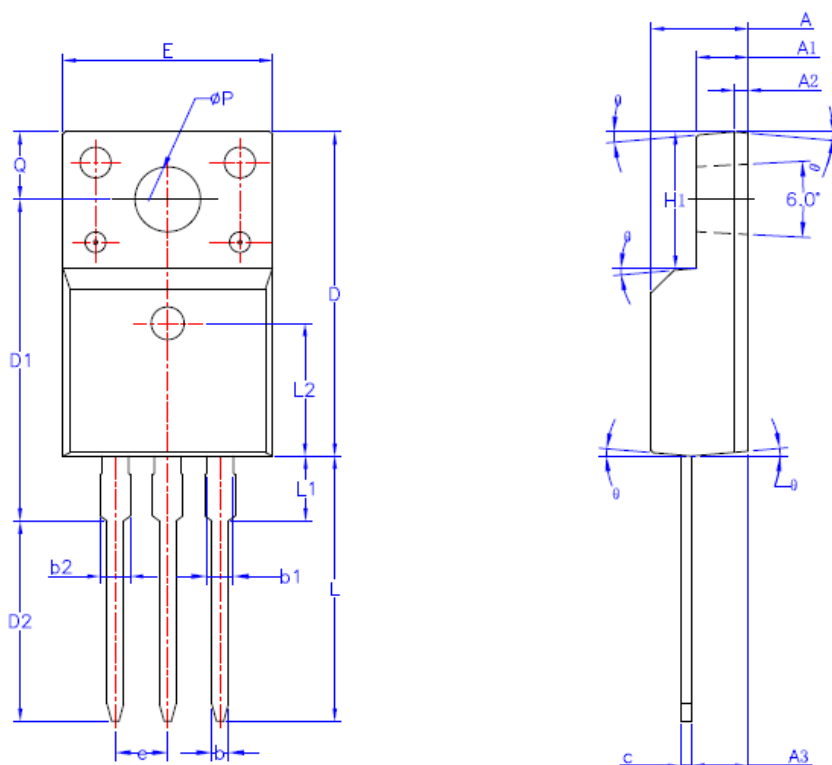
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	0.60	0.90
b1	-	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.6REF		
φ P	3.55	3.60	3.65
Q	2.73	-	2.87
θ 1	1°	3°	5°



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TO-220F-3L PACKAGE OUTLINE



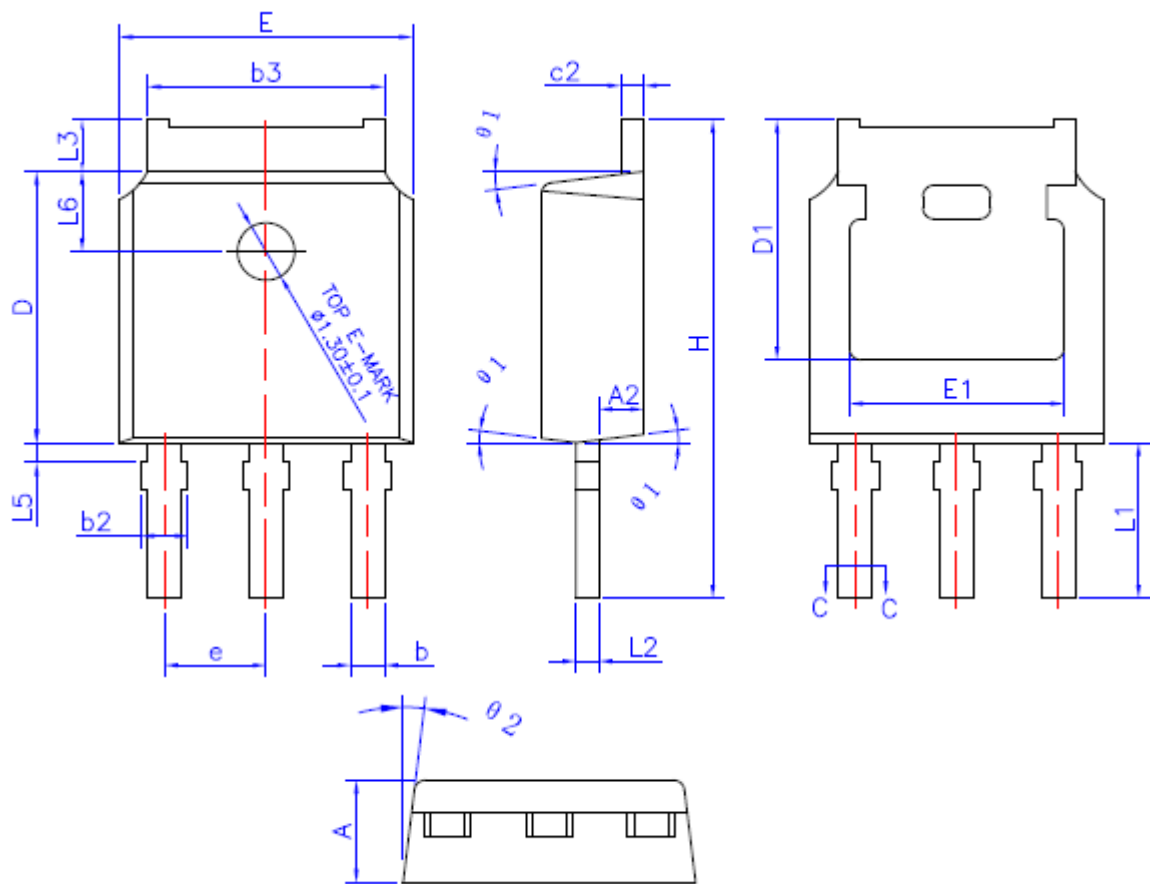
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.7REF		
A3	2.56	2.76	2.93
b	0.70	--	0.90
b1	1.18	--	1.40
b2	--	--	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.00
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	6.50REF		
φ P	3.08	3.18	3.28
Q	3.20	-	3.40
θ 1	1°	3°	5°



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TO-251S-3L PACKAGE OUTLINE



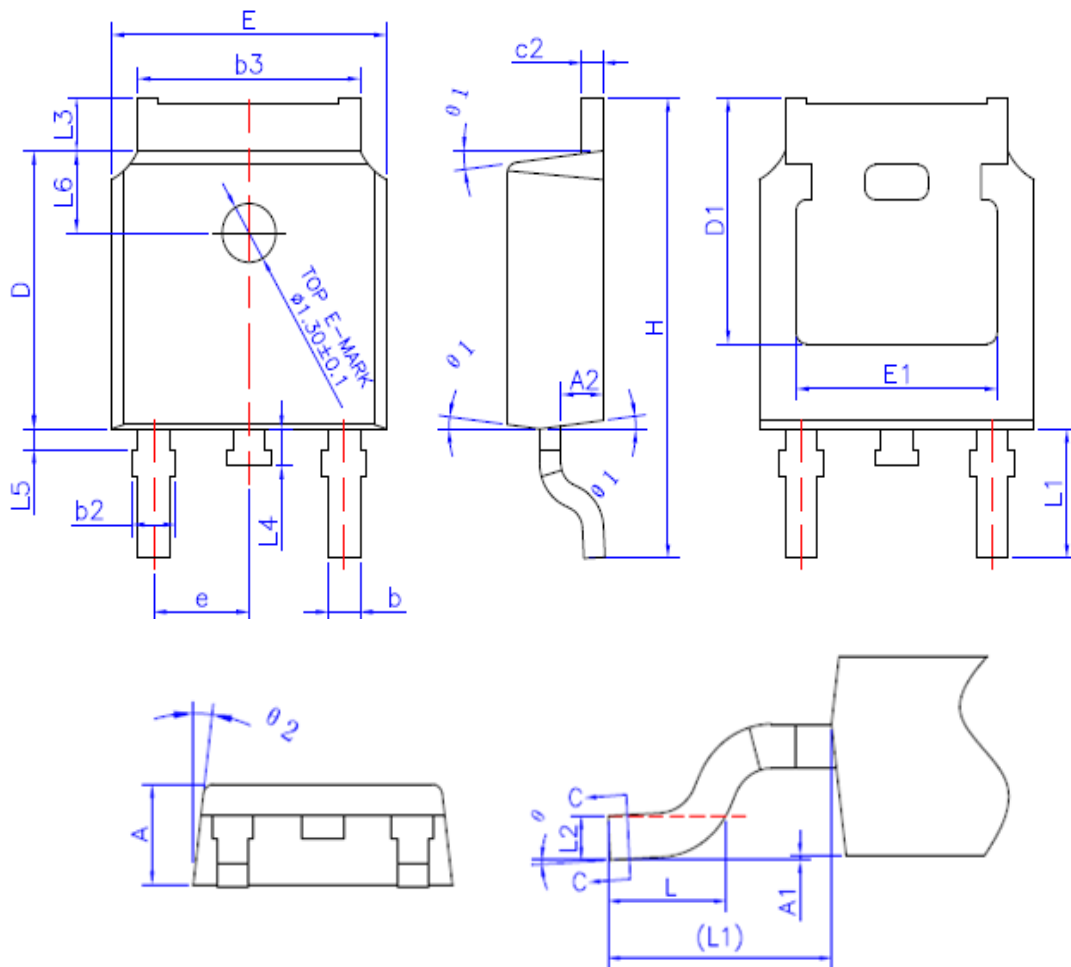
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.86	1.01	1.16
b	0.66	-	0.86
b2	0.66	--	0.96
b3	5.10	5.28	5.46
c	0.46	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.35REF		
E	6.40	6.60	6.80
E1	4.83REF		
e	2.3REF		
H	9.80	10.40	11.00
L1	3.50REF		
L2	0.508BSC		
L3	0.90	--	1.25
L5	0.15	--	0.75
L6	1.80REF		
$\theta 1$	5°	7°	9°
$\theta 2$	5°	7°	9°



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TO-252-2L PACKAGE OUTLINE



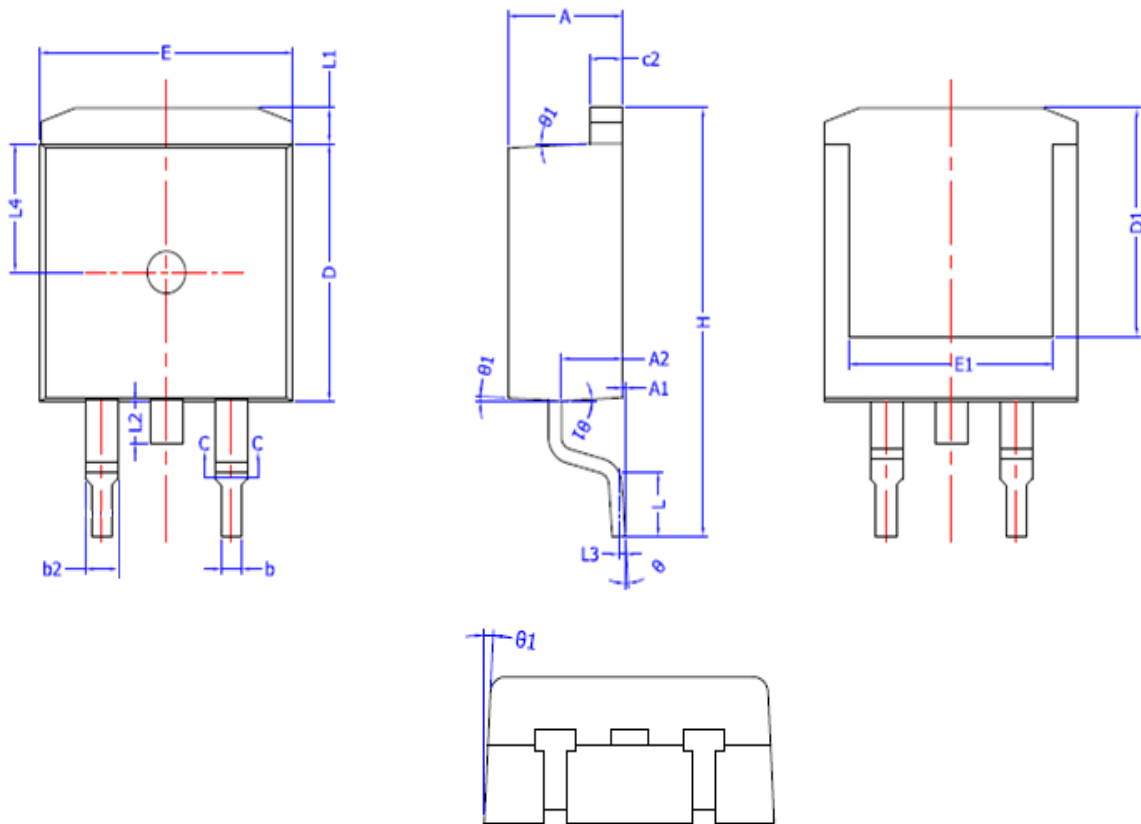
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	--	0.15
A2	0.90	1.01	1.10
b	0.72	-	0.85
b2	0.72	--	0.90
b3	5.13	5.33	5.46
c	0.47	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.25	--	--
E	6.40	6.60	6.80
E1	4.70	--	--
e	2.3REF		
H	9.80	10.10	10.40
L	1.40	1.60	1.80
L1	2.90REF		
L2	0.508BSC		
L3	0.90	--	1.25
L4	0.60	0.80	1.00
L5	0.15	--	0.75
L6	1.80REF		
θ	0°	3°	8°
$\theta 1$	5°	7°	9°
$\theta 2$	5°	7°	9°



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TO-263-2L PACKAGE OUTLINE



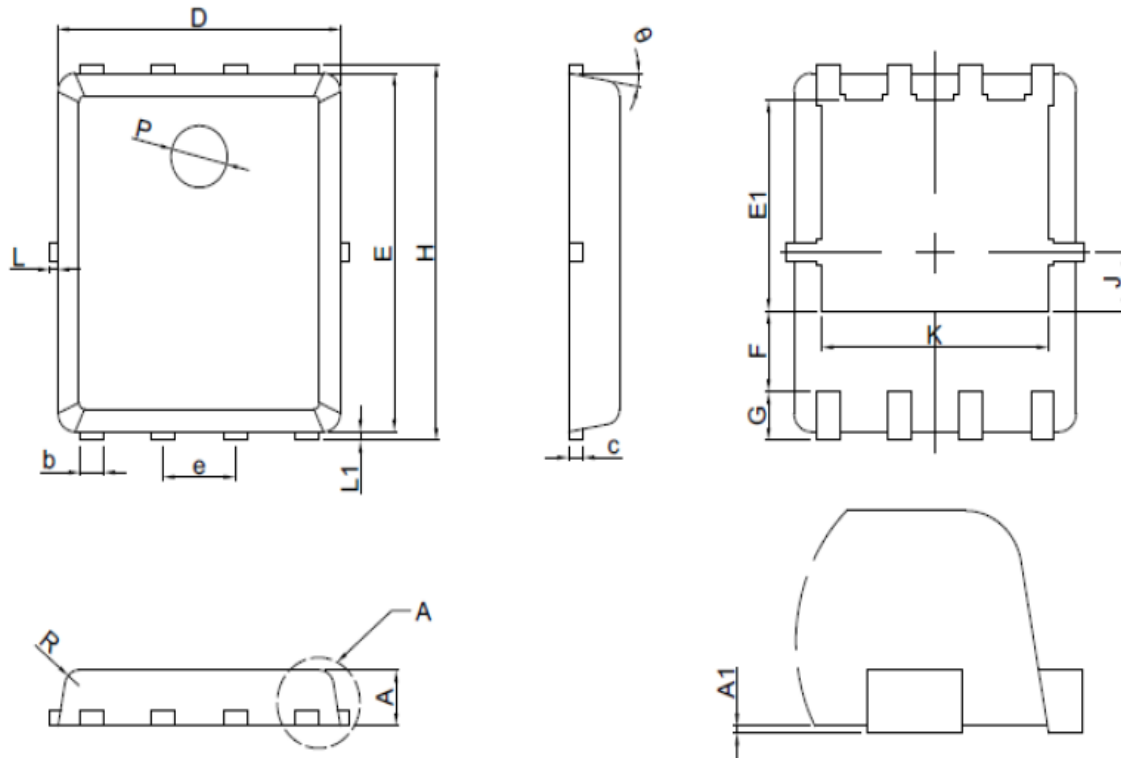
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.71	-	0.91
b2	1.17	--	1.37
c	0.47	--	0.60
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	--	--
E	9.80	9.90	10.00
E1	7.80	--	--
e	2.54BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.12	1.27	1.42
L2	--	--	1.75
L3	0.25BSC		
L4	4.60 REF		
θ	0°	--	8°
θ_1	1°	3°	5°



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PPAK5x6-8L 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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