



# 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

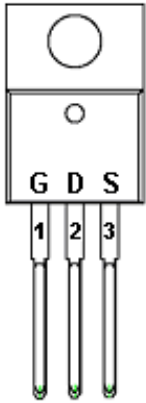
- ◆ 100V/100A,  $R_{DS(ON)}=8.2m\Omega@V_{GS}=10V$
- ◆ High density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/TO-220F-3L/TO-251S-3L/TO-252-2L/TO-263-2L /PPAK5x6-8L package design



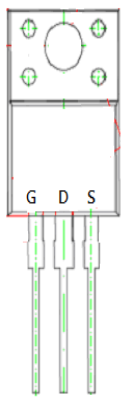
# SPN80T10 N-Channel Enhancement Mode MOSFET

## PIN CONFIGURATION

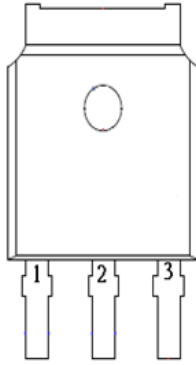
TO-220



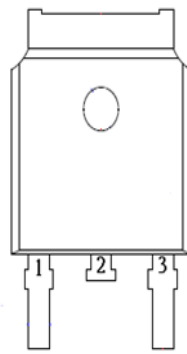
TO-220F



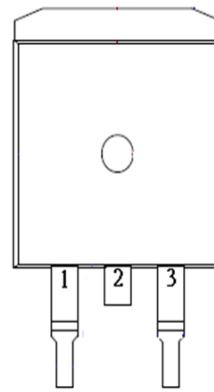
TO-251S-3L



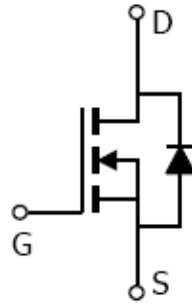
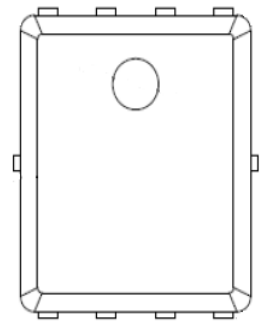
TO-252-2L



TO-263-2L



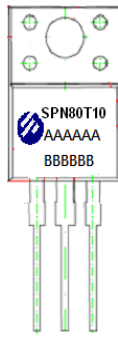
PPAK5x6



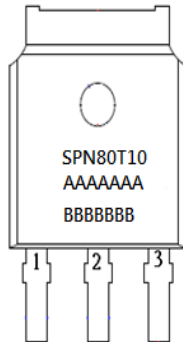
## PART MARKING



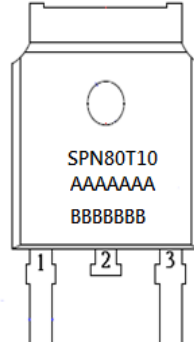
A : Lot Code  
B : Date Code  
(YY/MM/DD)



A: Lot Code  
B: Date Code  
(YYMMDD)



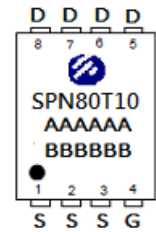
A : Lot Code  
B : Date Code



A : Lot Code  
B : Date Code



AAAAA: Wafer lot no  
BBBBBB : date code



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



# SPN80T10

## 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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## N-Channel Enhancement Mode MOSFET

### ABSOLUTE MAXIMUM RATINGS

(T<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V <sub>DSS</sub>	100	V
Gate –Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current(Silicon Limited)	I <sub>D</sub>	T <sub>c</sub> =25°C	100
		T <sub>c</sub> =70°C	71
Continuous Drain Current(Silicon Limited) (PPAK5x6)	I <sub>D</sub>	T <sub>c</sub> =25°C	85
		T <sub>c</sub> =70°C	60
Pulsed Drain Current	I <sub>DM</sub>	390	A
Power Dissipation@ T <sub>c</sub> =25°C	P <sub>D</sub>	TO-220/TO-263	104
Power Dissipation@ T <sub>c</sub> =25°C		TO-251S/TO-252/TO-220F	93
Power Dissipation@ T <sub>c</sub> =25°C		PPAK5x6	83
Avalanche Energy with Single Pulse ( T <sub>c</sub> =25°C , L = 0.5mH.)	EAS	400	mJ
Operating Junction Temperature	T <sub>J</sub>	-55/150	°C
Storage Temperature Range	T <sub>STG</sub>	-55/150	°C
Thermal Resistance-Junction to Case (TO-220/TO-220F/TO-263)	R <sub>θJC</sub>	1.2	°C/W
Thermal Resistance-Junction to Case (TO-251S/TO-252)	R <sub>θJC</sub>	1.35	°C/W
Thermal Resistance-Junction to Case (PPAK5x6)	R <sub>θJC</sub>	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<sub>A</sub>=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	100			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.0		4.0	
Gate Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =64V, V <sub>GS</sub> =0V T <sub>J</sub> = 25 °C			1	uA
		V <sub>DS</sub> =64V, V <sub>GS</sub> =0V T <sub>J</sub> =100°C			100	
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		6.4	8.2	mΩ
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =40A		75		S
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =Open, f=1MHz		1.6		Ω
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =20A, V <sub>GS</sub> =0V			1.2	V
<b>Dynamic</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V I <sub>D</sub> = 20A		56		nC
Gate-Source Charge	Q <sub>gs</sub>			14		
Gate-Drain Charge	Q <sub>gd</sub>			18		
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V f=1MHz		3600		pF
Output Capacitance	C <sub>oss</sub>			290		
Reverse Transfer Capacitance	C <sub>rss</sub>			88		
Turn-On Time	t <sub>d(on)</sub>	V <sub>DD</sub> =50V, R <sub>L</sub> =1Ω I <sub>D</sub> =20A, V <sub>GS</sub> =10V R <sub>G</sub> =10Ω		17		nS
	t <sub>r</sub>			40		
Turn-Off Time	t <sub>d(off)</sub>			57		
	t <sub>f</sub>			37		



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## TYPICAL CHARACTERISTICS

Fig 1. Typical Output Characteristics

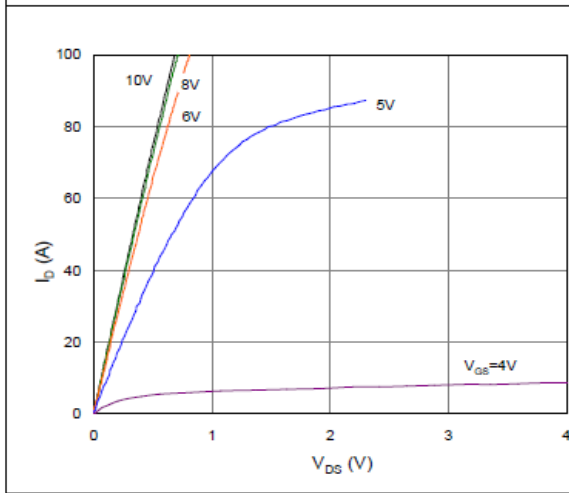


Figure 2. On-Resistance vs. Gate-Source Voltage

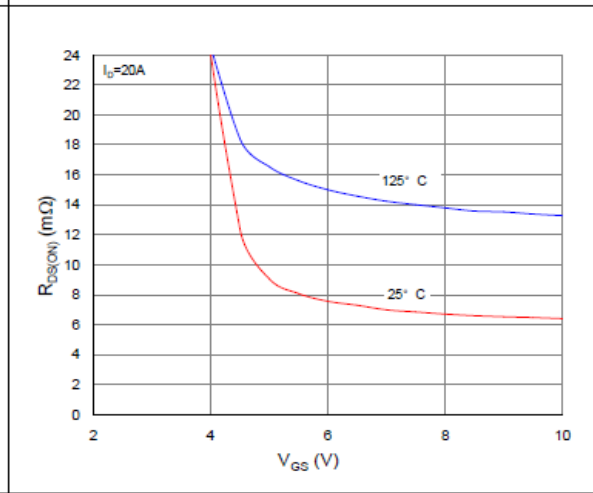


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

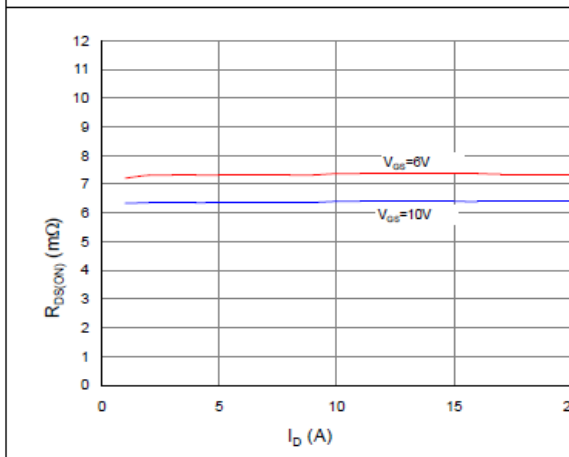


Figure 4. Normalized On-Resistance vs. Junction Temperature

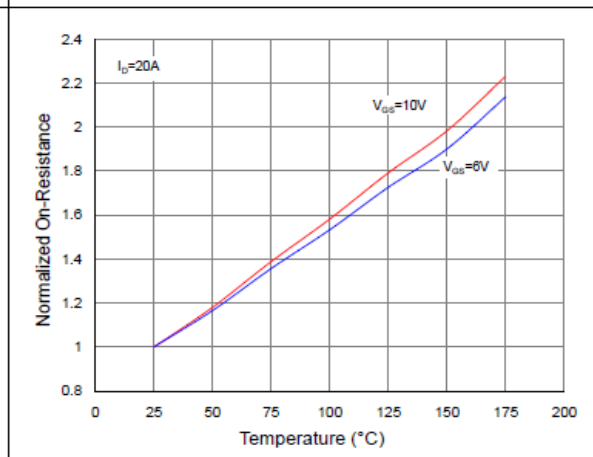


Figure 5. Typical Transfer Characteristics

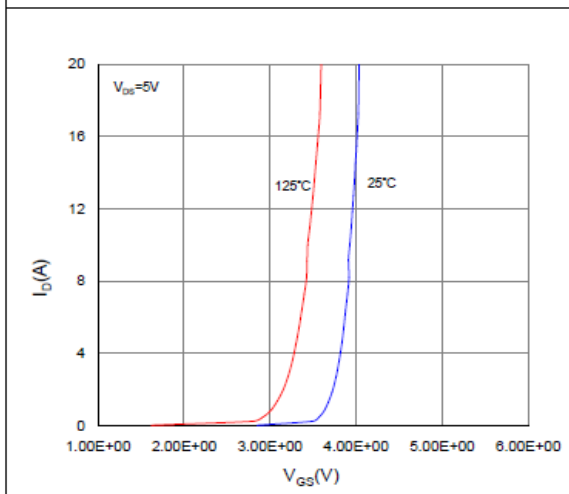
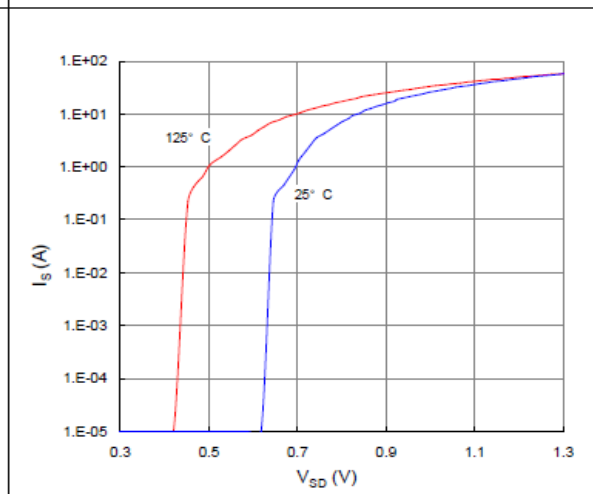


Figure 6. Typical Source-Drain Diode Forward Voltage





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### TYPICAL CHARACTERISTICS

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

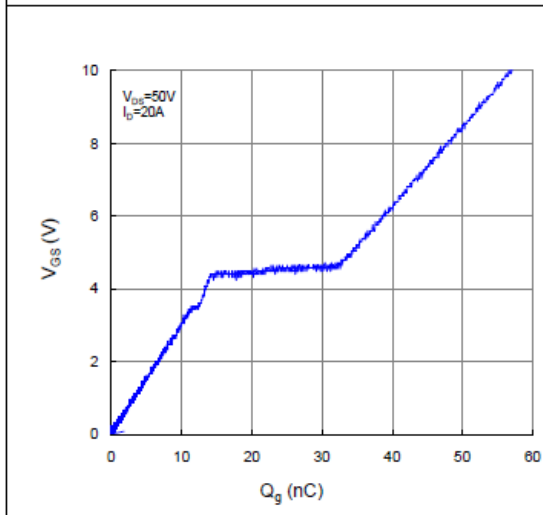


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

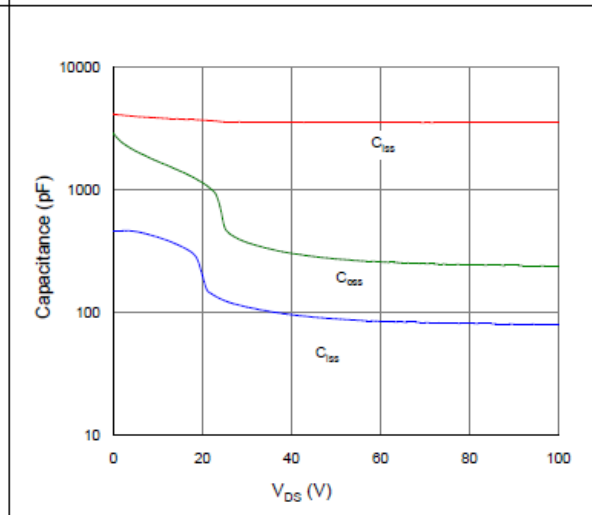


Figure 9. Maximum Safe Operating Area

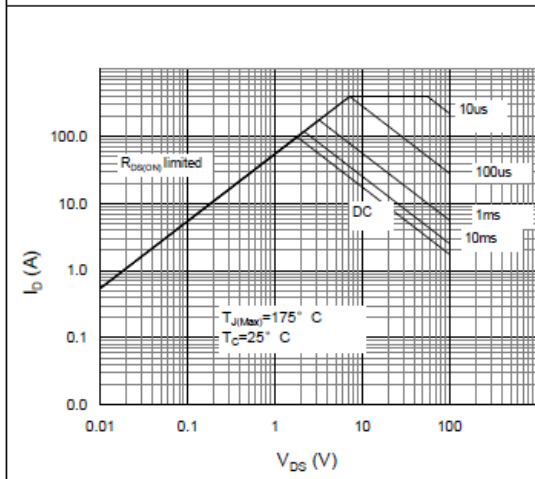


Figure 10. Maximum Drain Current vs. Case Temperature

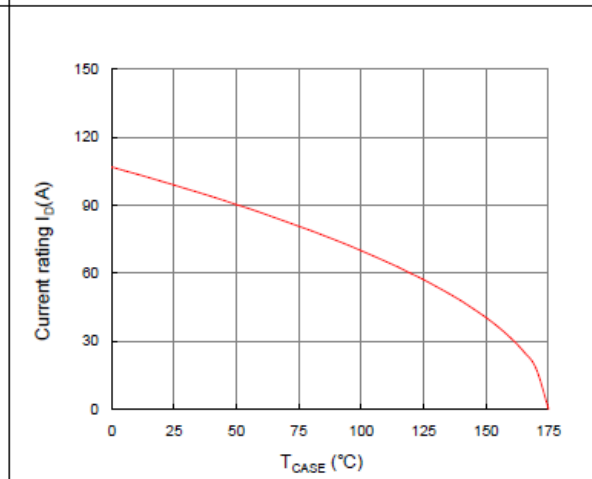
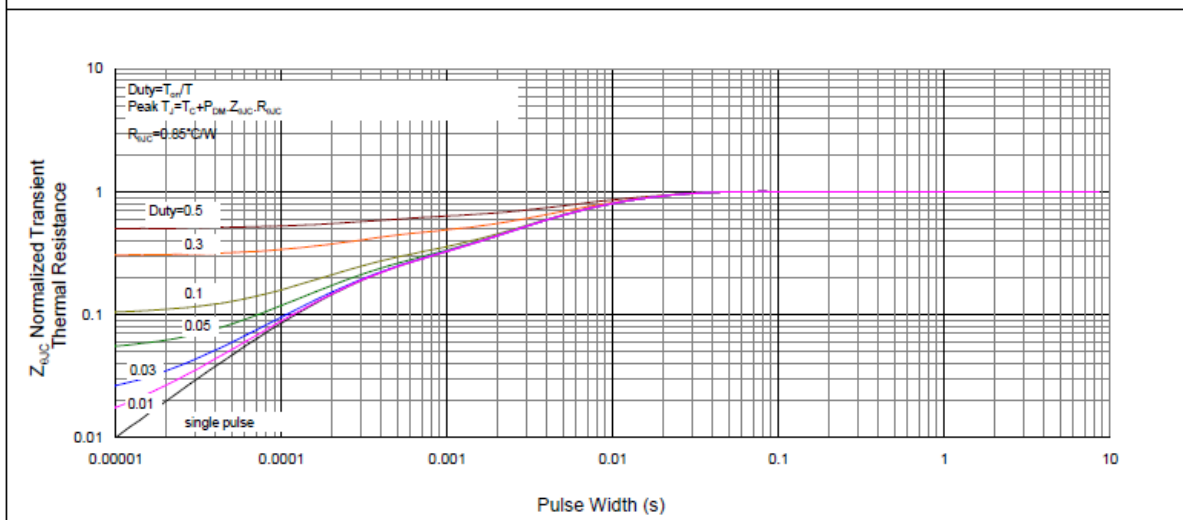


Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case

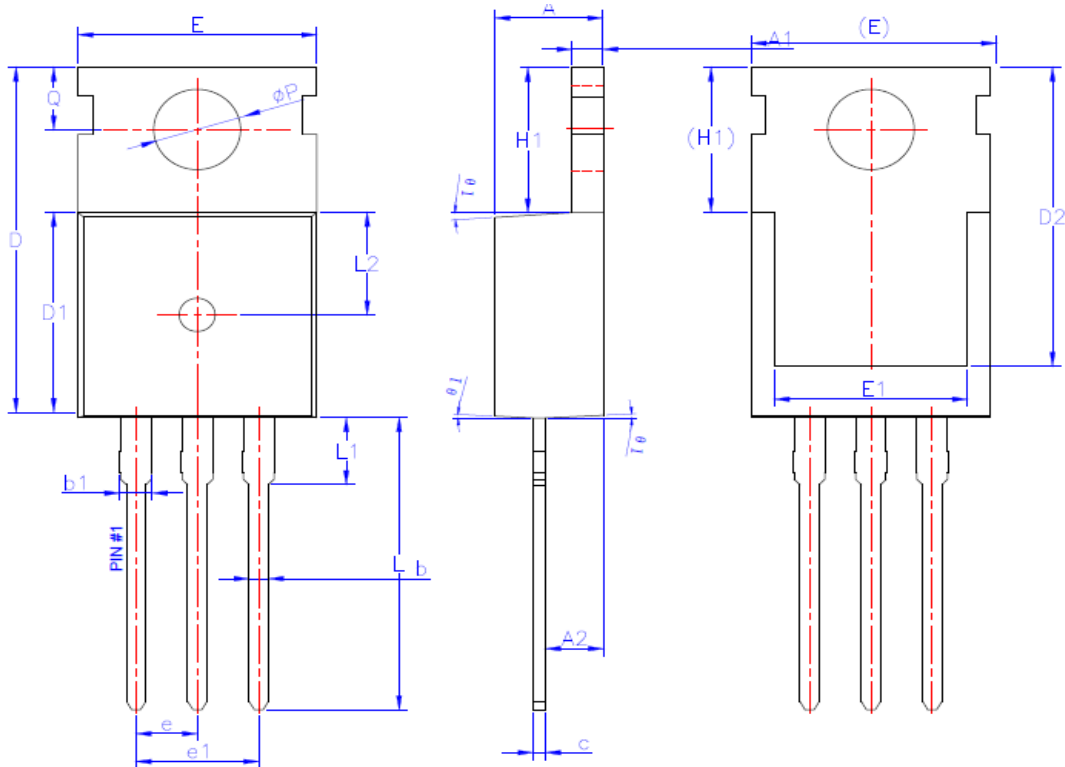




# SPN80T10

## N-Channel Enhancement Mode MOSFET

### 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		
$\phi P$	3.55	3.60	3.65
Q	2.73	-	2.87
$\theta 1$	1°	3°	5°

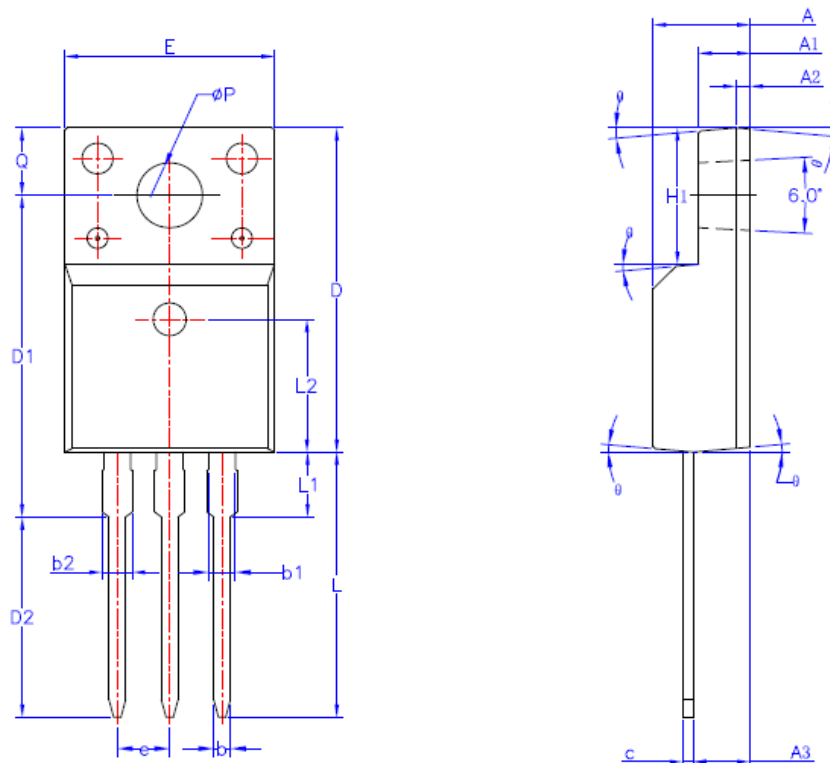




# SPN80T10

## N-Channel Enhancement Mode MOSFET

### TO-220F-3L PACKAGE OUTLINE



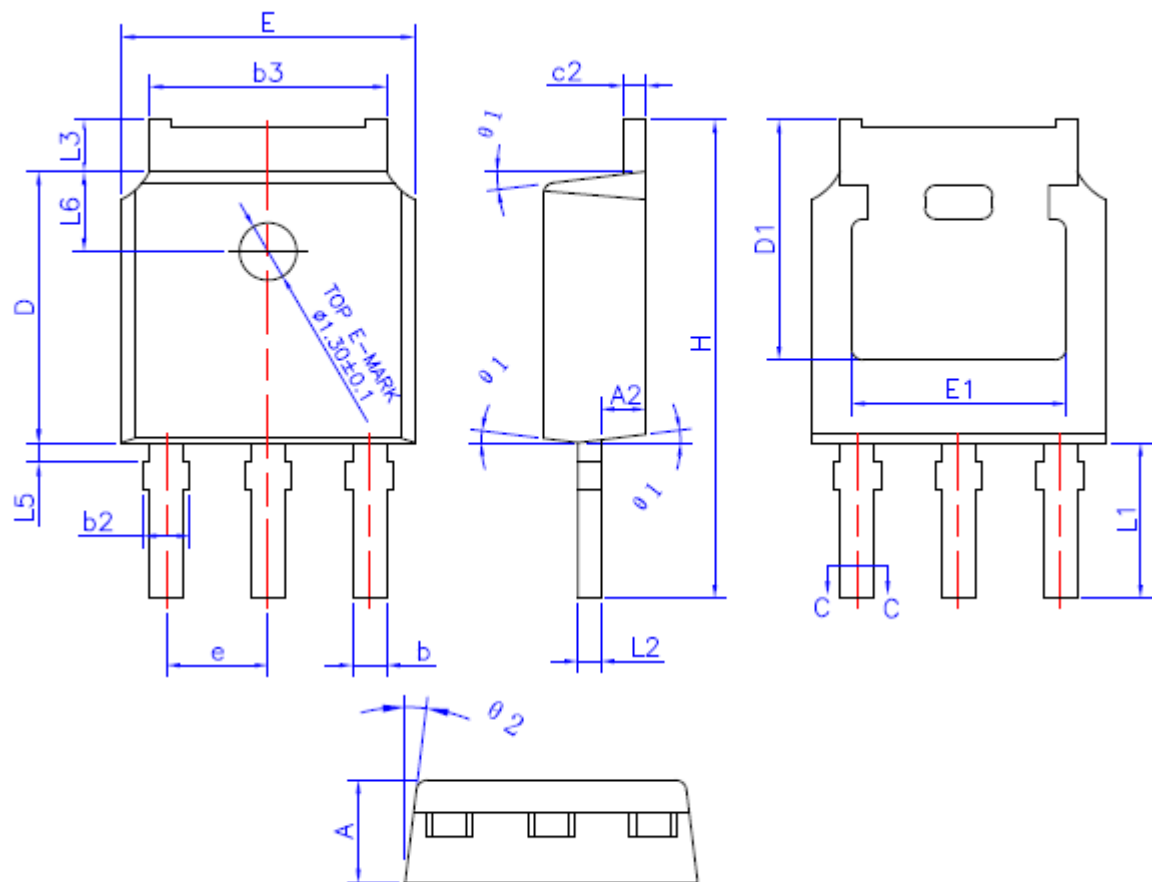
SYMBOL	MIN	NOM	MAX
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.7REF		
A3	2.56	2.76	2.93
b	0.70	--	0.90
b1	1.18	--	1.40
b2	--	--	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.00
E	9.96	10.16	10.36
e	2.54BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	6.50REF		
φ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



# SPN80T10

## N-Channel Enhancement Mode MOSFET

### TO-251S-3L PACKAGE OUTLINE



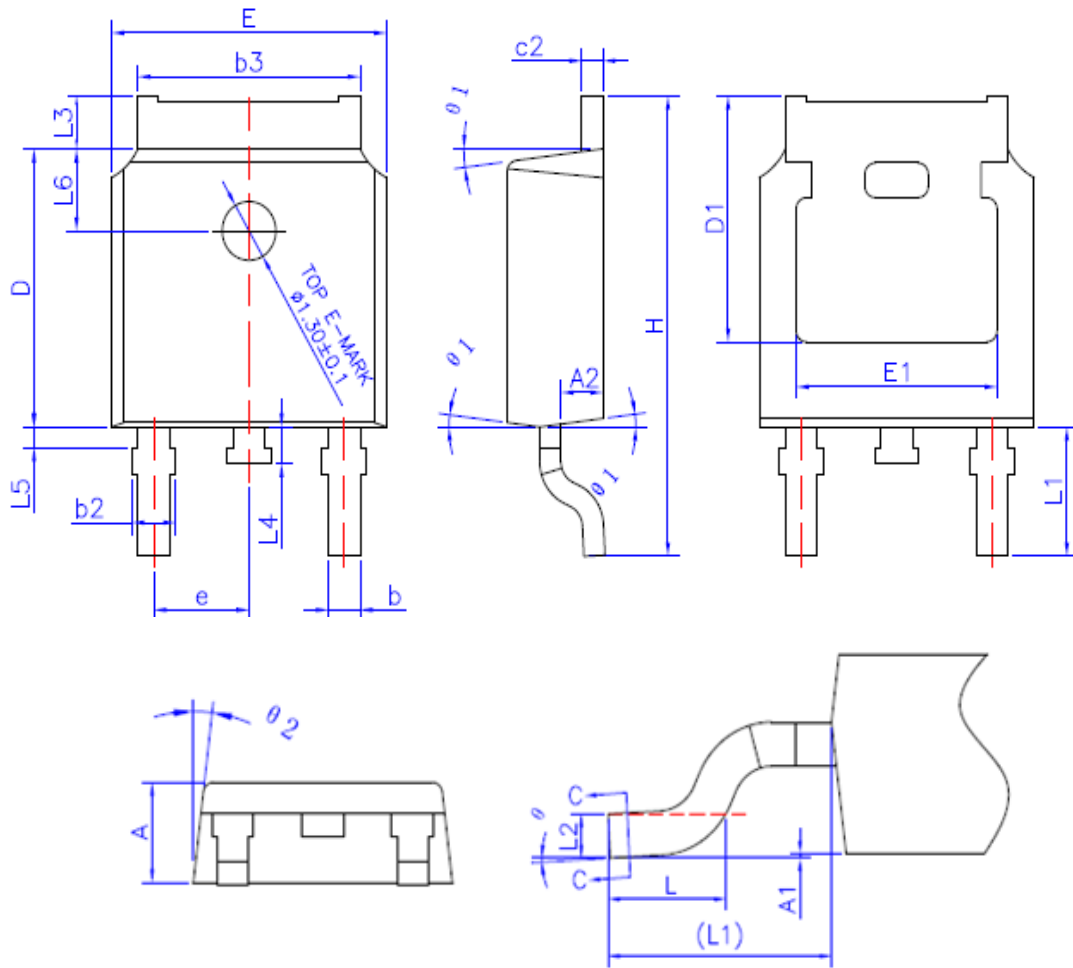
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A2	0.86	1.01	1.16
b	0.66	-	0.86
b2	0.66	--	0.96
b3	5.10	5.28	5.46
c	0.46	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.35REF		
E	6.40	6.60	6.80
E1	4.83REF		
e	2.3REF		
H	9.80	10.40	11.00
L1	3.50REF		
L2	0.508BSC		
L3	0.90	--	1.25
L5	0.15	--	0.75
L6	1.80REF		
$\theta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



# SPN80T10

## N-Channel Enhancement Mode MOSFET

### TO-252-2L PACKAGE OUTLINE



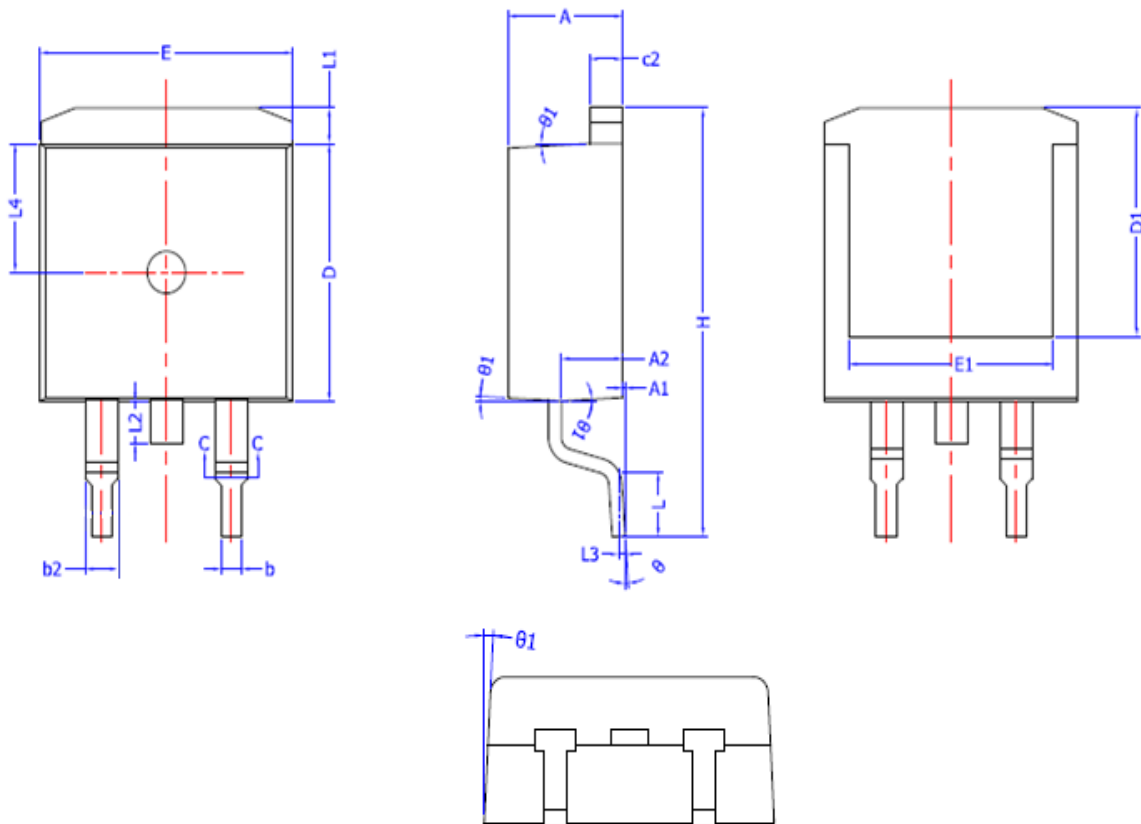
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	--	0.15
A2	0.90	1.01	1.10
b	0.72	-	0.85
b2	0.72	--	0.90
b3	5.13	5.33	5.46
c	0.47	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.25	--	--
E	6.40	6.60	6.80
E1	4.70	--	--
e	2.3REF		
H	9.80	10.10	10.40
L	1.40	1.60	1.80
L1	2.90REF		
L2	0.508BSC		
L3	0.90	--	1.25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



# SPN80T10

## N-Channel Enhancement Mode MOSFET

### TO-263-2L PACKAGE OUTLINE



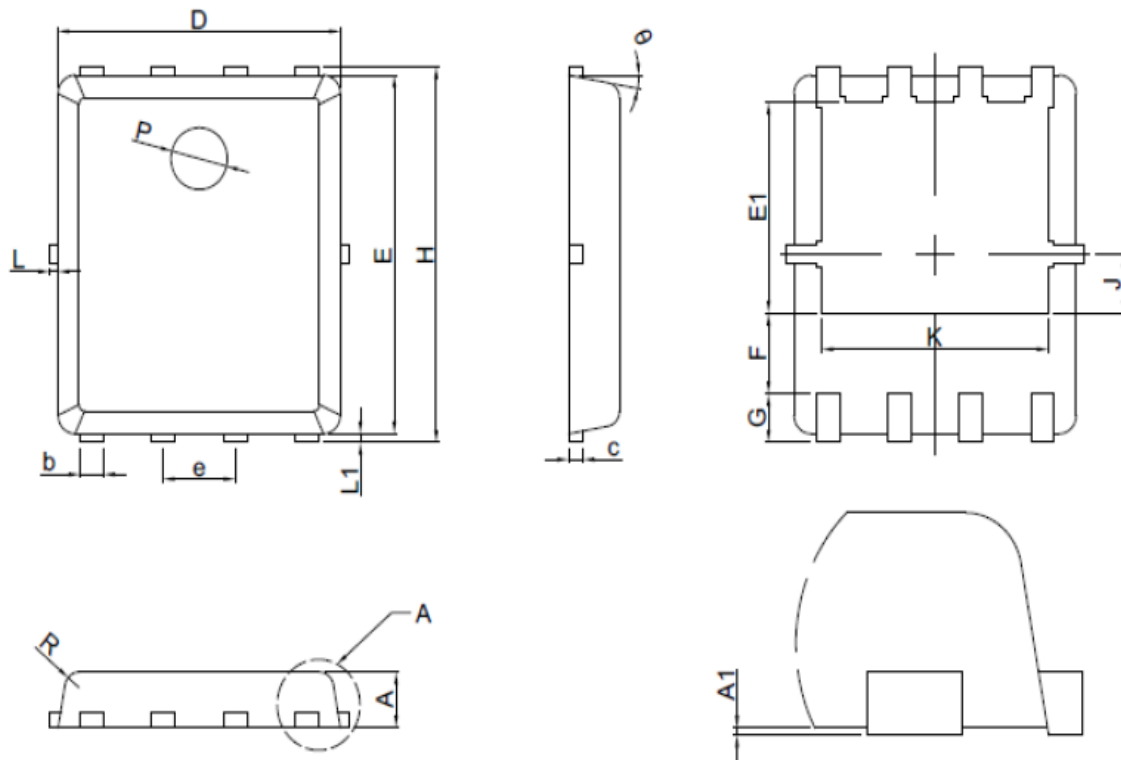
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.71	-	0.91
b2	1.17	--	1.37
c	0.47	--	0.60
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	--	--
E	9.80	9.90	10.00
E1	7.80	--	--
e	2.54BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.12	1.27	1.42
L2	--	--	1.75
L3	0.25BSC		
L4	4.60 REF		
$\theta$	0°	--	8°
$\theta_1$	1°	3°	5°



# SPN80T10

## N-Channel Enhancement Mode MOSFET

### PPAK5x6-8L PACKAGE OUTLINE



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.8	0.95	1.1
A1	0	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		
$\theta$	6°	10°	14°
R	0.25REF		



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