



SPN3009

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN3009 is the N-Channel logic enhancement mode power field effect transistors are produced using high cell density, DMOS trench technology. The SPN3009 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.

FEATURES

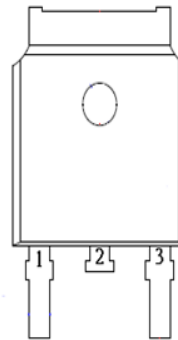
- ◆ 30V/30A, $R_{DS(ON)}=9m\Omega@V_{GS}=10V$
- ◆ 30V/15A, $R_{DS(ON)}=13.5m\Omega@V_{GS}=4.5V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-252-2L/TO-251S-3L package design

APPLICATIONS

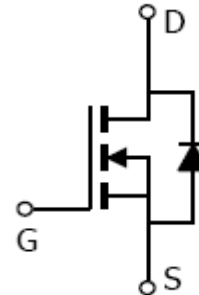
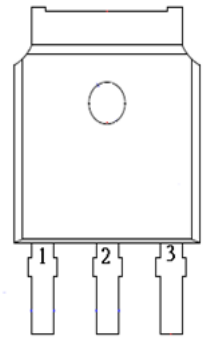
- High Frequency Synchronous Buck Converter
- DC/DC Power System
- Load Switch

PIN CONFIGURATION

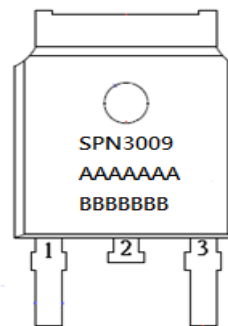
TO-252-2L



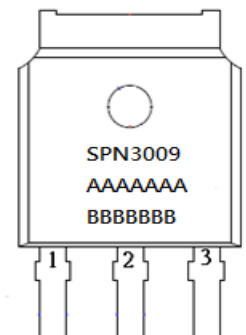
TO-251S-3L



PART MARKING



A : Lot Code
B : Date Code



A : Lot Code
B : Date Code



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PIN DESCRIPTION

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

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN3009ST251TGB	TO-251S-3L	SPN3009
SPN3009T252RGB	TO-252-2L	SPN3009

※ SPN3009T252RGB : Tape Reel ; Pb – Free ; Halogen - Free

※ SPN3009ST251TGB: Tube ; Pb – Free; Halogen – Free

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit	
Drain-Source Voltage	V _{DSS}	30	V	
Gate –Source Voltage	V _{GSS}	±20	V	
Continuous Drain Current	I _D	TA=25°C	51	A
		TA=100°C	36	
Pulsed Drain Current	I _{DM}	120	A	
Avalanche Current	I _{AS}	34	A	
Single Pulse Avalanche Energy	E _{AS}	130	mJ	
Power Dissipation	P _D	2	W	
Operating Junction Temperature	T _J	150	°C	
Storage Temperature Range	T _{STG}	-55/150	°C	
Thermal Resistance-Junction to Ambient (t ≤ 10s)	R _{θJA}	62	°C/W	



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ELECTRICAL CHARACTERISTICS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0		2.5	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=24V, V_{GS}=0V$			1	uA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ C$			5	
On-State Drain Current	$I_{D(on)}$	$V_{DS}\geq 5V, V_{GS}=10V$			51	A
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=30A$		7.5	9	mΩ
		$V_{GS}=4.5V, I_D=15A$		11	13.5	
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=30A$		42		S
Diode Forward Voltage	V_{SD}	$I_S=1A, V_{GS}=0V$			1	V
Single Pulse Avalanche Energy	EAS	$V_{DD}=25V, L=0.1mH, I_{AS}=20A$	45			mJ
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=15V, V_{GS}=4.5V, I_D=15A$		10.6		nC
Gate-Source Charge	Q_{gs}			4.2		
Gate-Drain Charge	Q_{gd}			4		
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V, f=1MHz$		1127		pF
Output Capacitance	C_{oss}			194		
Reverse Transfer Capacitance	C_{rss}			78		
Turn-On Time	$t_{d(on)}$	$V_{DD}=15V, I_D=15A, V_{GEN}=10V, R_G=3.3\Omega$		6.4	13	nS
	t_r			70	127	
Turn-Off Time	$t_{d(off)}$			22.5	45	
	t_f			8	18	



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TYPICAL CHARACTERISTICS

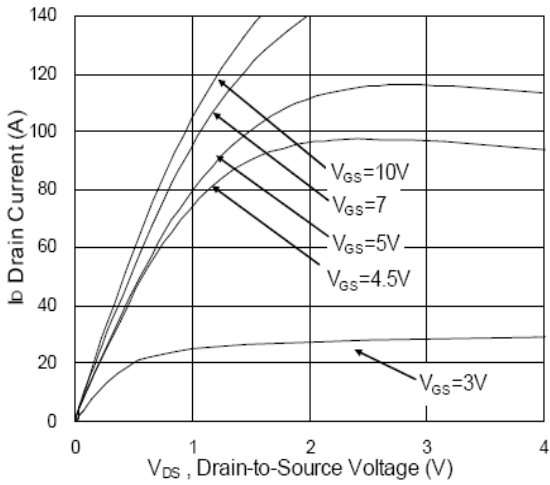


Fig. 1 Typical Output Characteristics

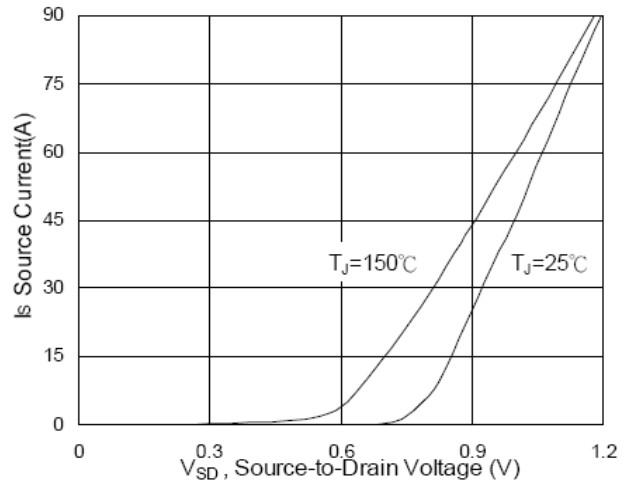


Fig. 2 Transfer Characteristics

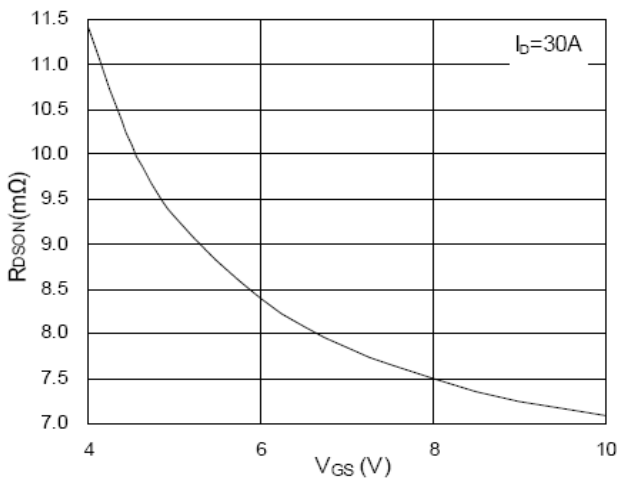


Fig. 3 On-Resistance vs Gate voltage

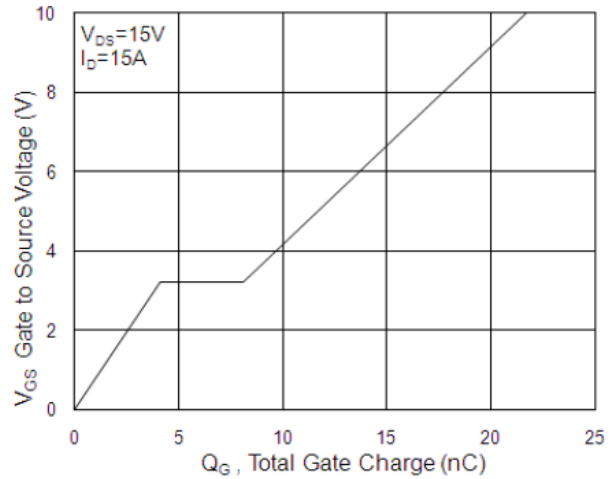


Fig. 4 Gate Charge Characteristics

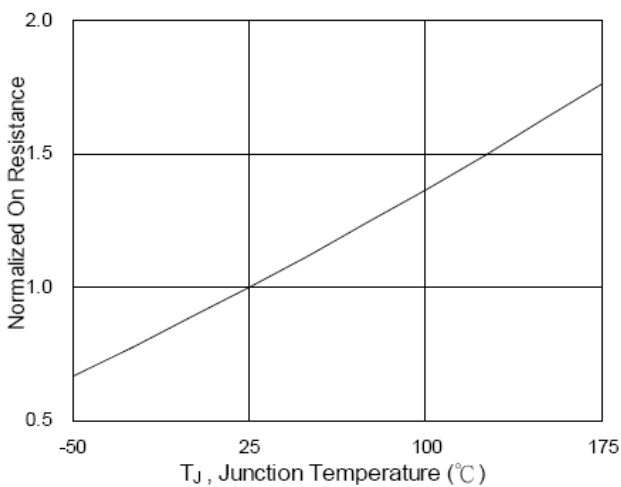


Fig. 5 On-Resistance vs Junction Temp

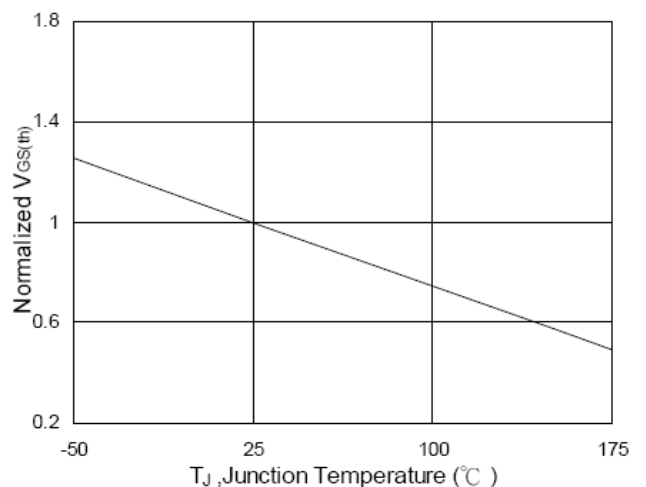


Fig. 6 Vgs vs Junction Temperature



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TYPICAL CHARACTERISTICS

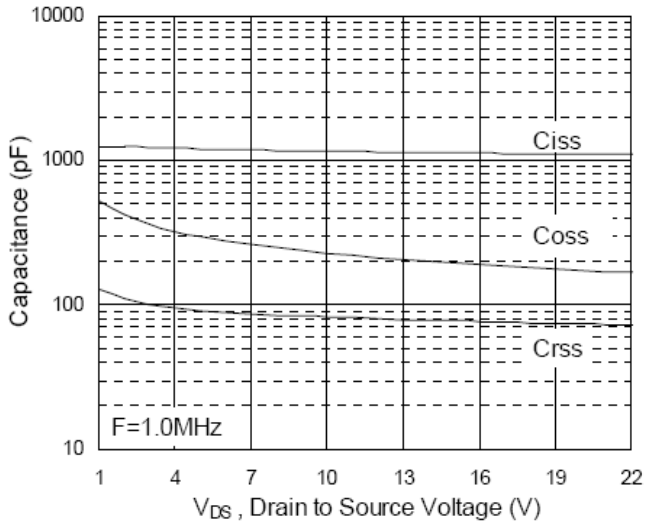


Fig. 7 Typical Capacitance Characteristics

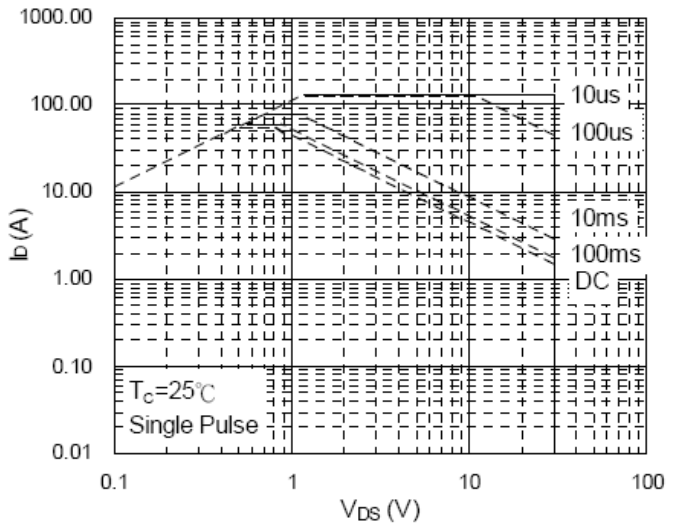


Fig. 8 Maximum Safe Operation Area

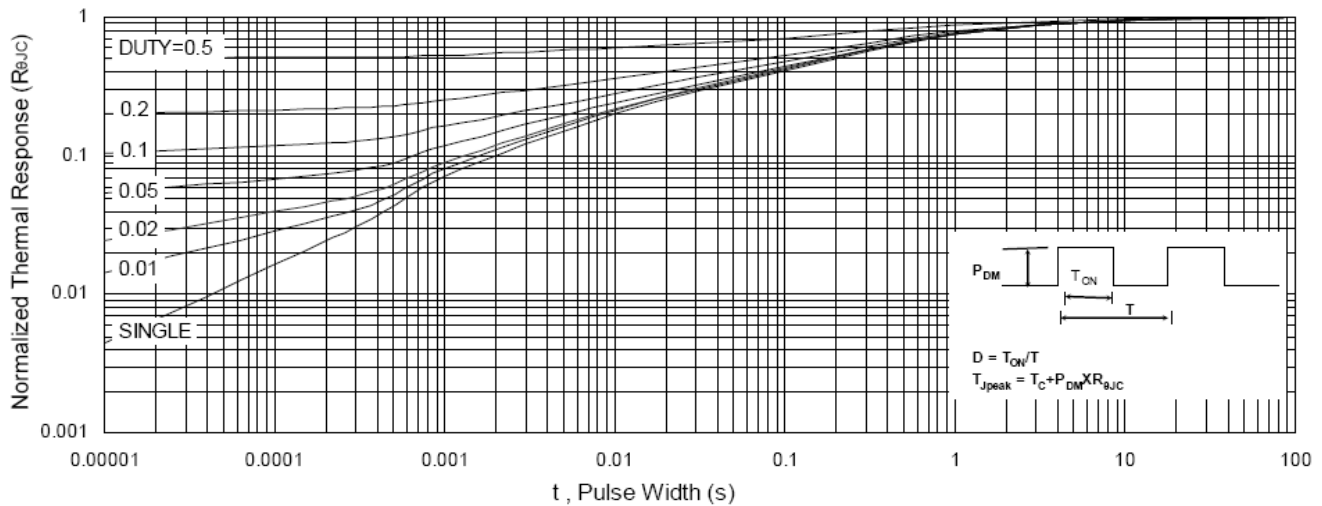


Fig. 9 Effective Transient Thermal Impedance

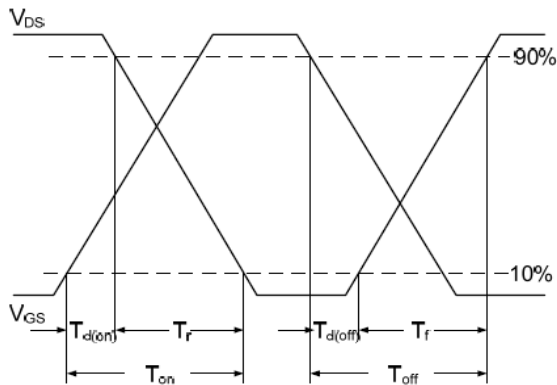


Fig. 10 Switching Time Waveform

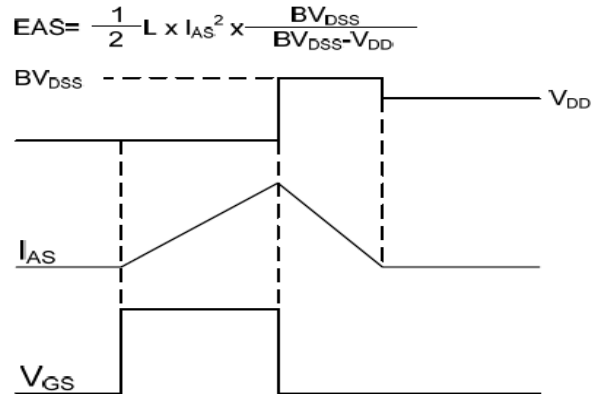


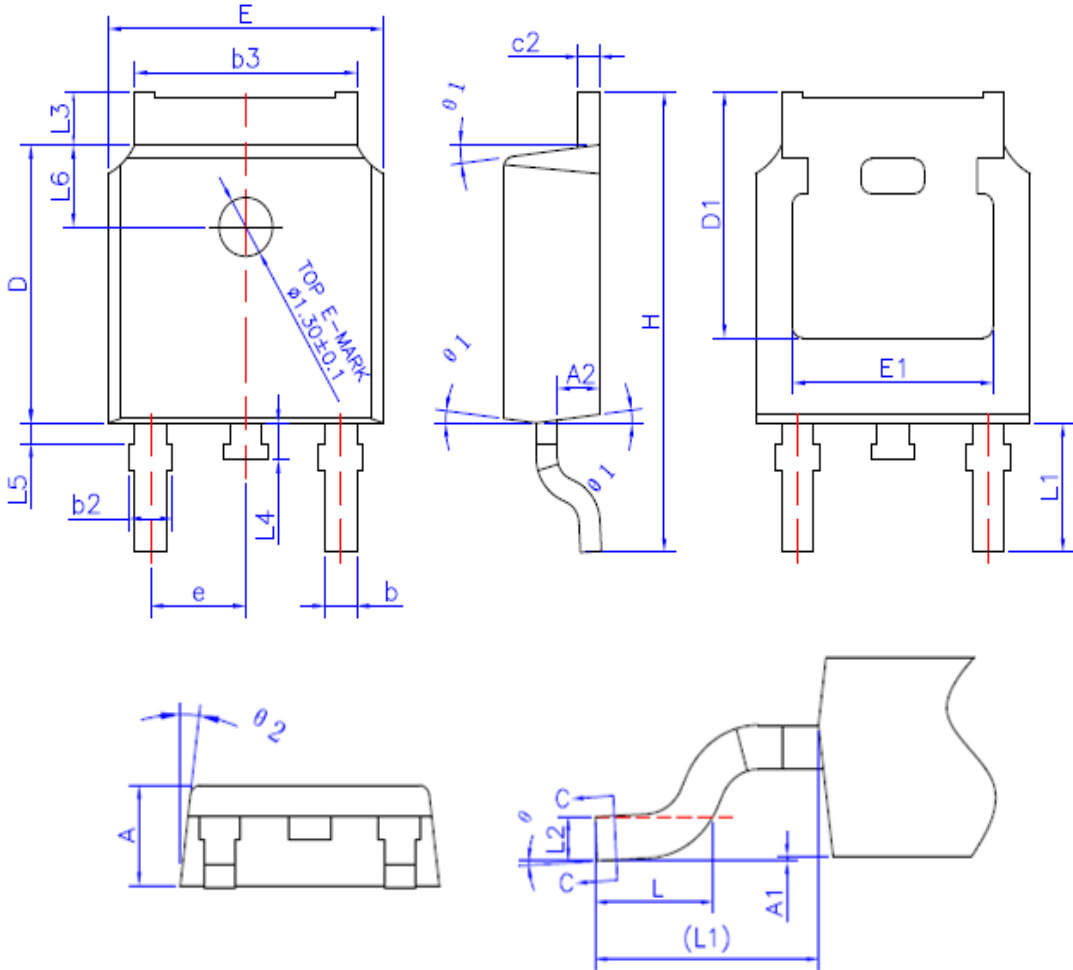
Fig. 11 Unclamped Inductive Waveform



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TO-252-2L PACKAGE OUTLINE



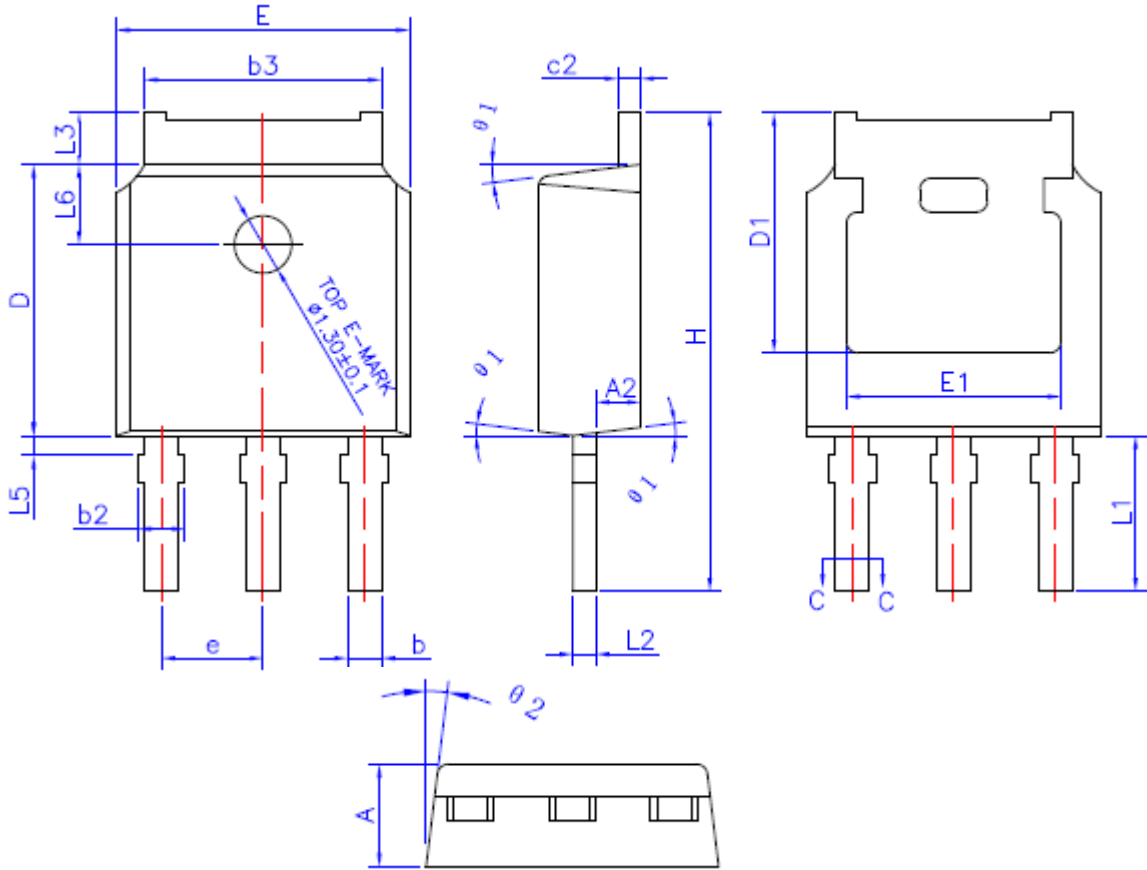
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	--	0.15
A2	0.90	1.01	1.10
b	0.72	-	0.85
b2	0.72	--	0.90
b3	5.13	5.33	5.46
c	0.47	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.25	--	--
E	6.40	6.60	6.80
E1	4.70	--	--
e	2.3REF		
H	9.80	10.10	10.40
L	1.40	1.60	1.80
L1	2.90REF		
L2	0.508BSC		
L3	0.90	--	1.25
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-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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