

30V, 90A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

The SFN3009T uses advanced Trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety applications.

Features

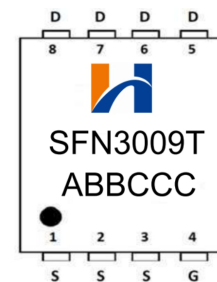
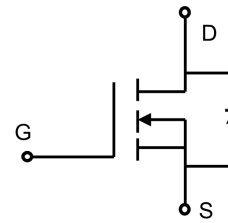
◆ $V_{DS}=30V, I_D=90A$

◆ $R_{DS(on)}$

TYP: $3.5m\Omega @ V_{GS}=10V, I_D=30A$

Applications

- ◆ Power factor correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



PDFN3X*-8L

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFN3009T	PDFN3X3-8L	SFN3009T	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	90	A
	$T_C = 100^{\circ}\text{C}$		50	
Drain Current Pulsed(Note 1)		I_{DM}	300	A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C		P_D	46	W
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	240	mJ
Operation Junction Temperature Range		T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.5	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDSS}	V _{GS} =0V, I _D =250μA	30	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V	--	--	1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	1.0	1.5	2.5	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10 V, I _D =30A	--	3.5	4.2	mΩ
		V _{GS} =4.5V, I _D =20A	--	5.4	7.0	
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	1	4.6	10	Ω
Input Capacitance	C _{iSS}	V _{DS} =15V V _{GS} =0V f=1.0MHZ	--	1930	--	pF
Output Capacitance	C _{oSS}		--	308	--	
Reverse Transfer Capacitance	C _{rSS}		--	266	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =15V, V _{GS} =10V R _G =3Ω; I _D =30A (Note 3.4)	--	13.1	--	ns
Turn-on Rise Time	t _r		--	34..5	--	
Turn-off Delay Time	t _{d(off)}		--	41.1	--	
Turn-off Fall Time	t _f		--	16.3	--	

Total Gate Charge	Q_g	$V_{DS}=15V, I_D=30A$ $V_{GS}=10V$ (Note 3.4)	--	41.6	--	nc
Gate-Source Charge	Q_{gs}		--	4.1	--	
Gate-Drain Charge	Q_{gd}		--	14.5	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	90	A
Pulsed Source Current	I_{SM}		--	--	300	
Diode Forward Voltage	V_{SD}	$I_S=30A, V_{GS}=0V$	--	0.83	1.2	V

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH, V_{DD}=15V, V_G=10V, R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure1: Output Characteristics

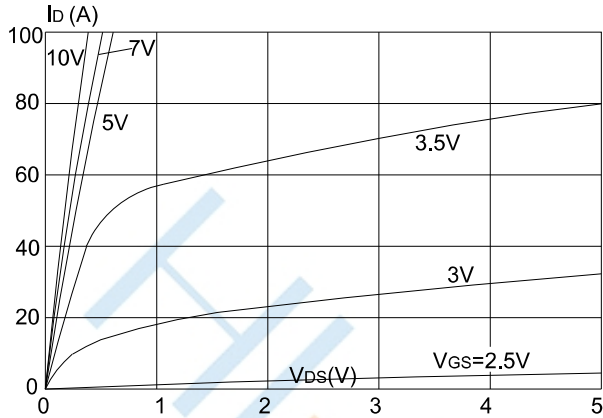


Figure 2: Typical Transfer Characteristics

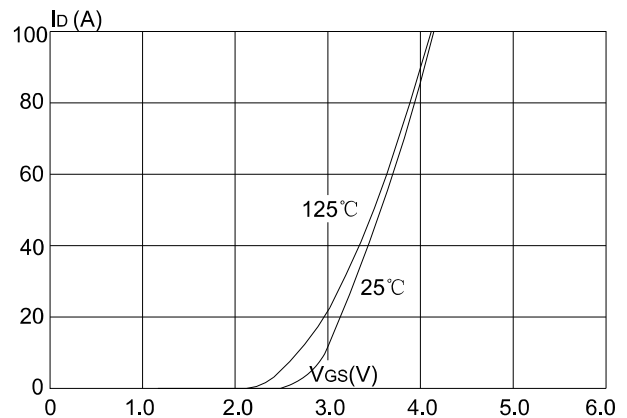


Figure 3: On-resistance vs. Drain Current

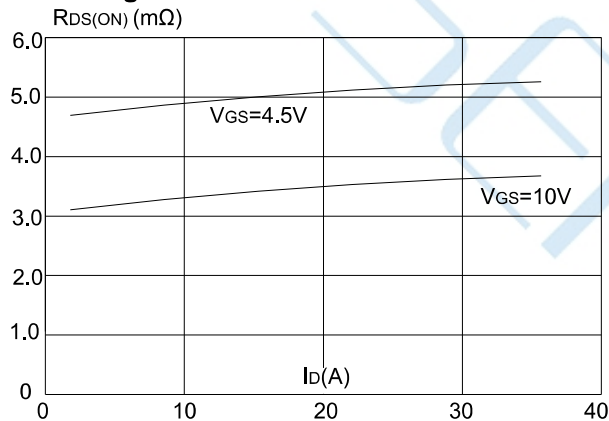


Figure 4: Body Diode Characteristics

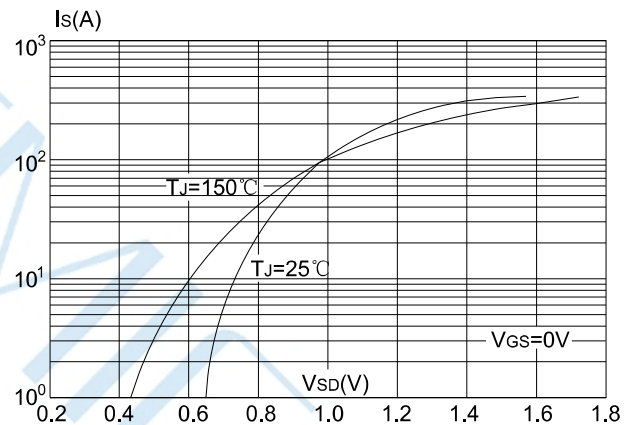


Figure 5: Gate Charge Characteristics

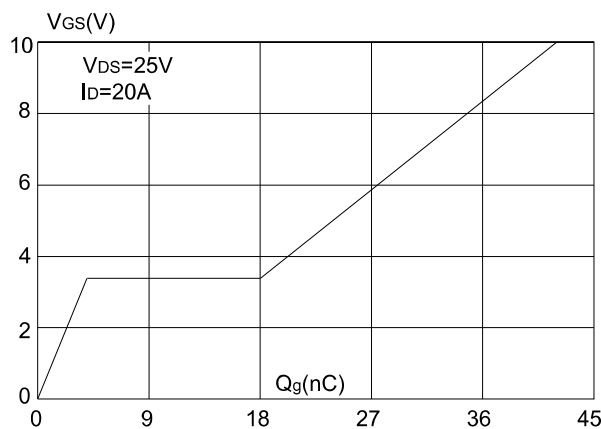
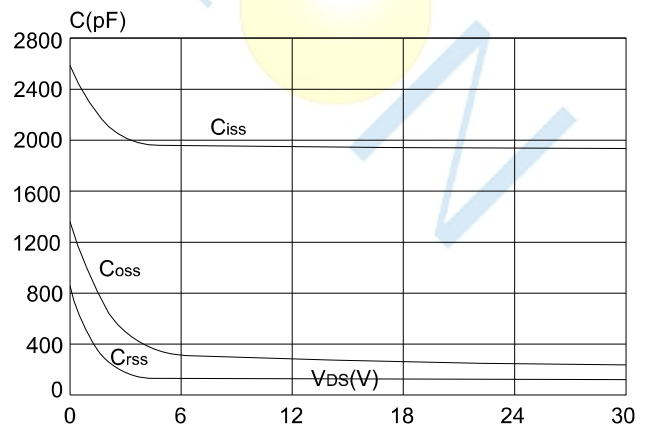


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

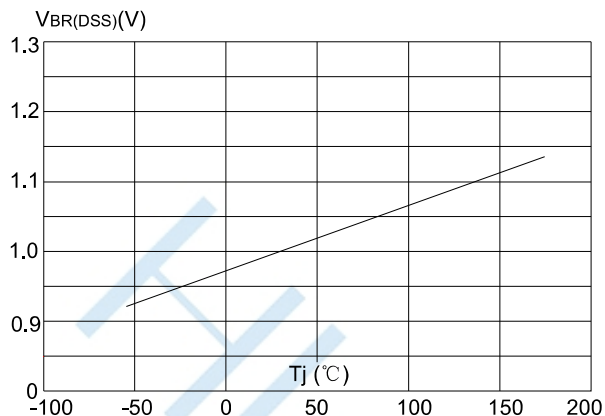


Figure 8: Normalized on Resistance vs. Junction Temperature

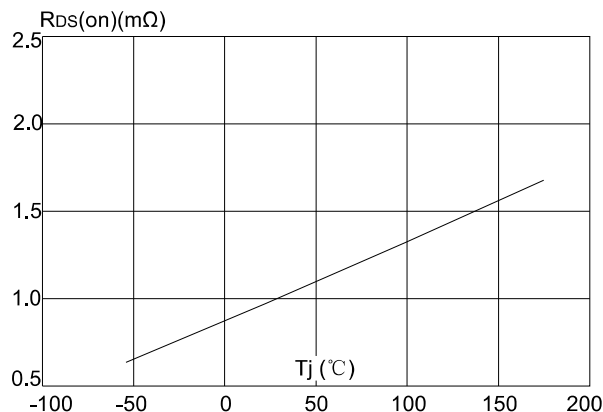


Figure 9: Maximum Safe Operating Area

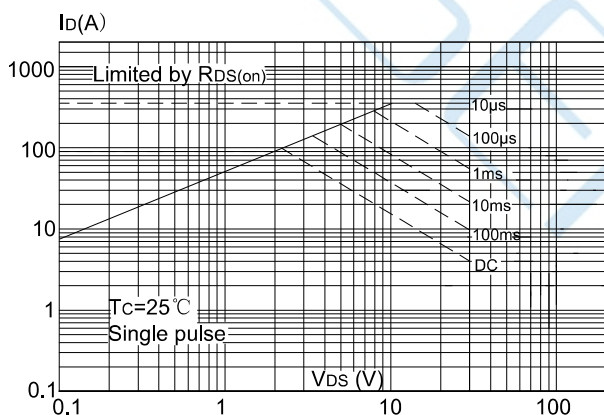


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

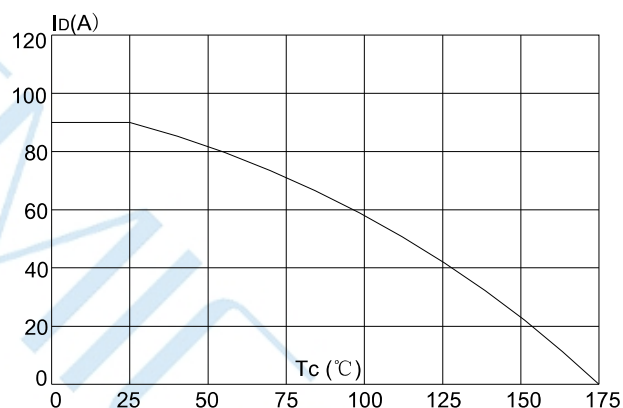
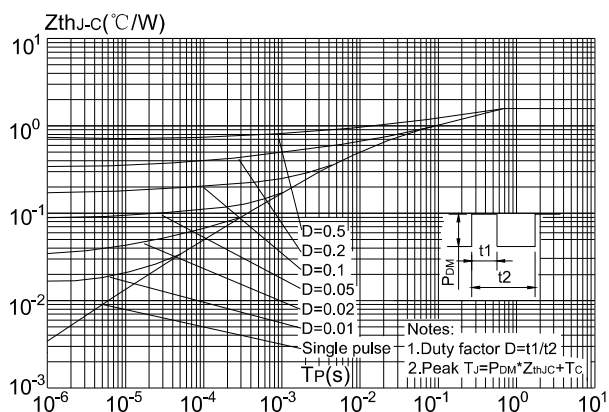
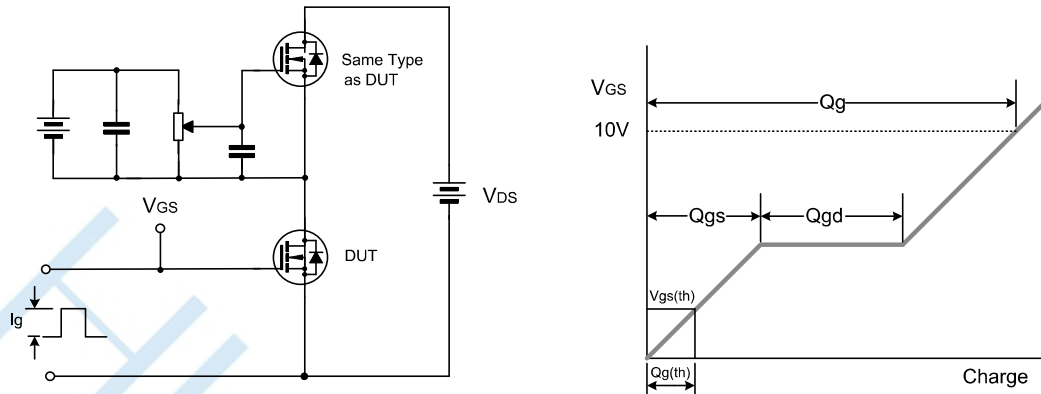


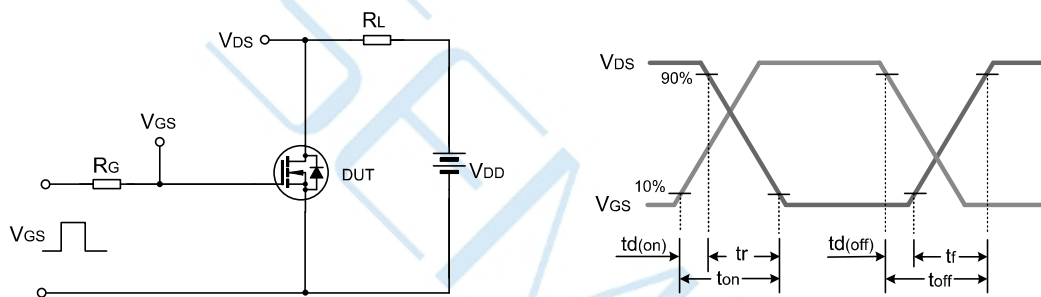
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



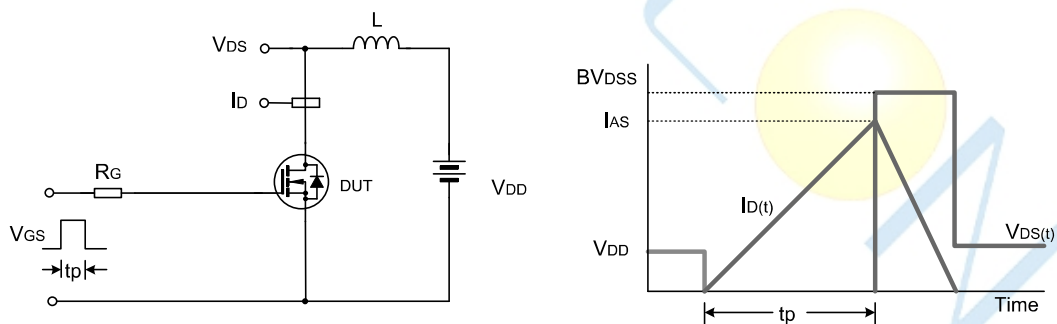
Test Circuit



Gate Charge Test Circuit & Waveform

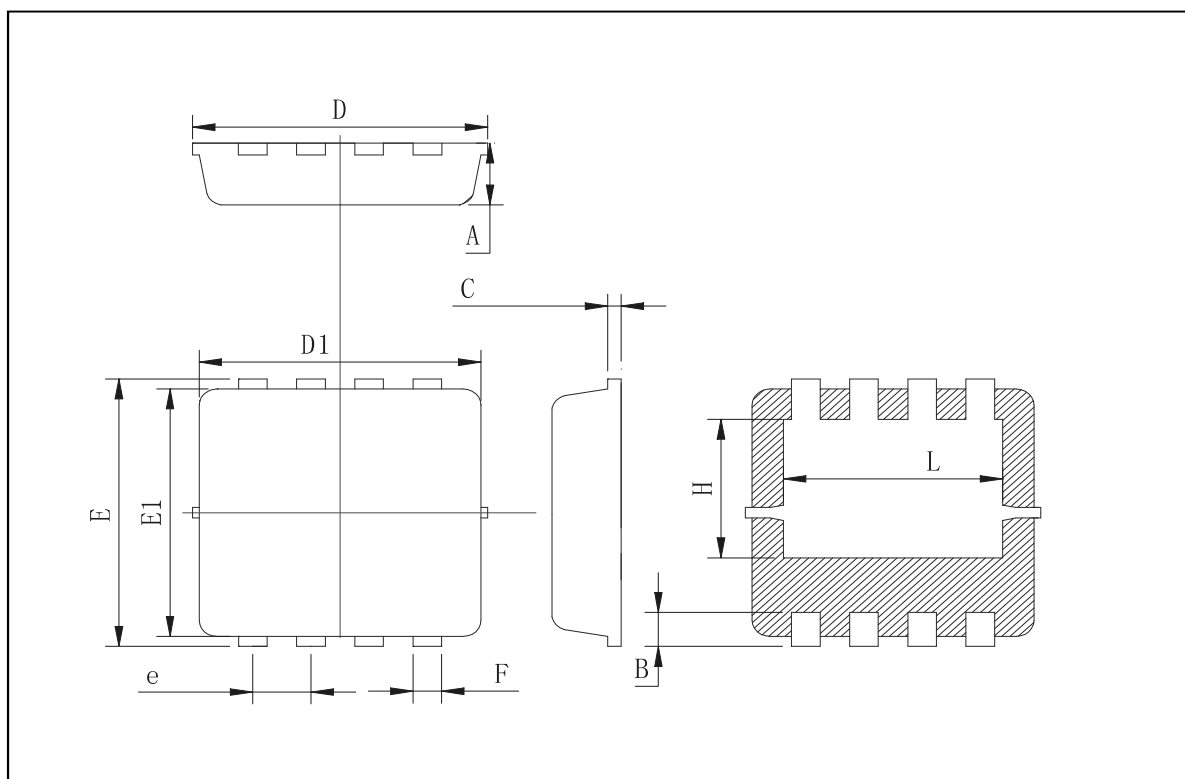


Resistive Switching Test Circuit & Waveform



EAS Test Circuit & Waveform

Package Dimensions of PDFN3X3-8L



Symbol	Min	Typ	Max
A	0.725	0.775	0.825
B	0.28	0.38	0.48
C	0.13	0.15	0.20
D	3.20	3.30	3.35
D1	3.05	3.15	3.25
E	3.25	3.35	3.45
E1	3.0	3.1	3.2
e	0.60	0.65	0.70
F	0.27	0.32	0.37
H	1.63	1.73	1.83
L	2.35	2.45	2.55

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