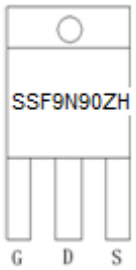
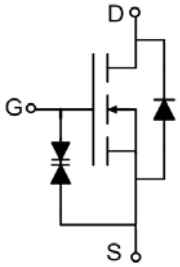
Main Product Characteristics:

V_{DSS}	900V
R_{DS}(on)	1.2Ω (typ.)
I_D	9A

TO-247



Marking and pin Assignment



Schematic diagram

Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature
- ESD Rating(HBM) :4KV

Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating:

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V①	9	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V①	5.8	
I_{DM}	Pulsed Drain Current②	36	
P_D @TC = 25°C	Power Dissipation③	160	W
	Linear Derating Factor	1.3	W/°C
V_{DS}	Drain-Source Voltage	900	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=25mH	500	mJ
I_{AS}	Avalanche Current @ L=25mH	6.4	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

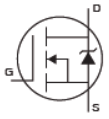
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case③	—	0.78	℃/W
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	50	℃/W

Electrical Characterizes @T_A=25℃ unless otherwise specified

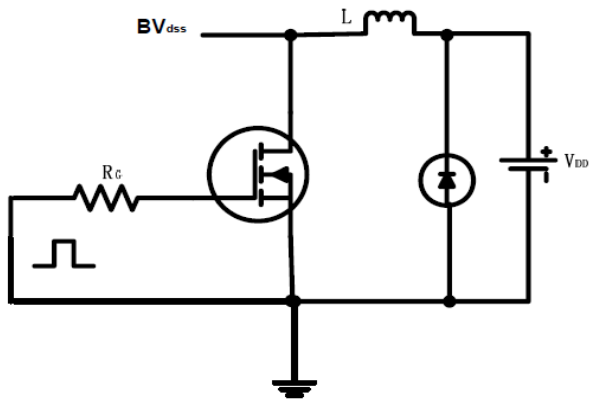
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	900	—	—	V	V_{GS} = 0V, ID = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	1.2	1.4	Ω	V_{GS}=10V,I_D = 3.5A
$V_{GS(th)}$	Gate threshold voltage	2	—	4	V	V_{DS} = V_{GS}, I_D = 250μA
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 900V,V_{GS} = 0V
		—	—	50		T_J = 125℃
I_{GSS}	Gate-to-Source forward leakage	—	—	10	μA	V_{GS} =20V
		—	—	-10		V_{GS} = -20V
gfs	Forward Transconductance	—	10	—	S	Vds>2Id*Rdson.max. Id=9A
Q_g	Total gate charge	—	47	—	nC	I_D = 9A, V_{DS}= 400V, V_{GS} = 10V
Q_{gs}	Gate-to-Source charge	—	10	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	17	—		
$t_{d(on)}$	Turn-on delay time	—	16	—	ns	V_{GS}=10V, VDS=450V, R_{GEN}=4.7Ω ID=4A
t_r	Rise time	—	10	—		
$t_{d(off)}$	Turn-Off delay time	—	50	—		
t_f	Fall time	—	23	—		
C_{iss}	Input capacitance	—	2100	—	pF	V_{GS} = 0V V_{DS} = 25V f = 1MHz
C_{oss}	Output capacitance	—	152	—		
C_{rss}	Reverse transfer capacitance	—	12	—		

Source-Drain Ratings and Characteristics

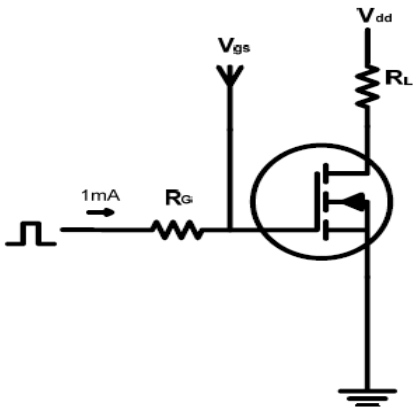
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	9	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	36	A	
V_{SD}	Diode Forward Voltage	—		1.5	V	I_S=9A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	305	—	ns	T_J = 25°C, I_F =9A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	2200	—	nC	

Test circuits and Waveforms

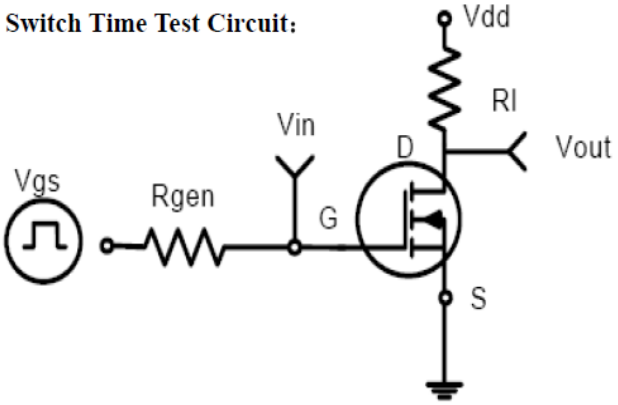
EAS test circuits:



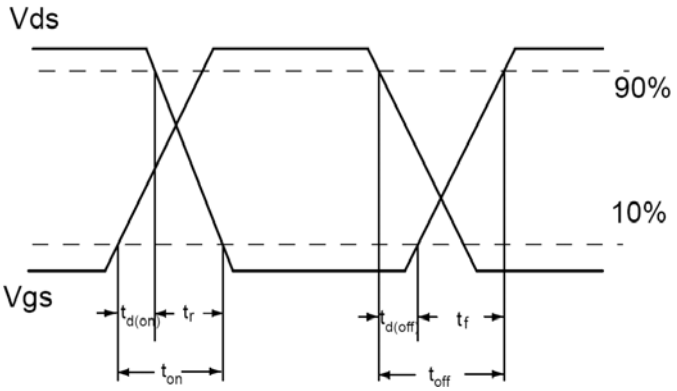
Gate charge test circuit:



Switch Time Test Circuit:



Switch Waveforms:



Notes:

①The maximum current rating is limited by bond-wires.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

Typical electrical and thermal characteristics

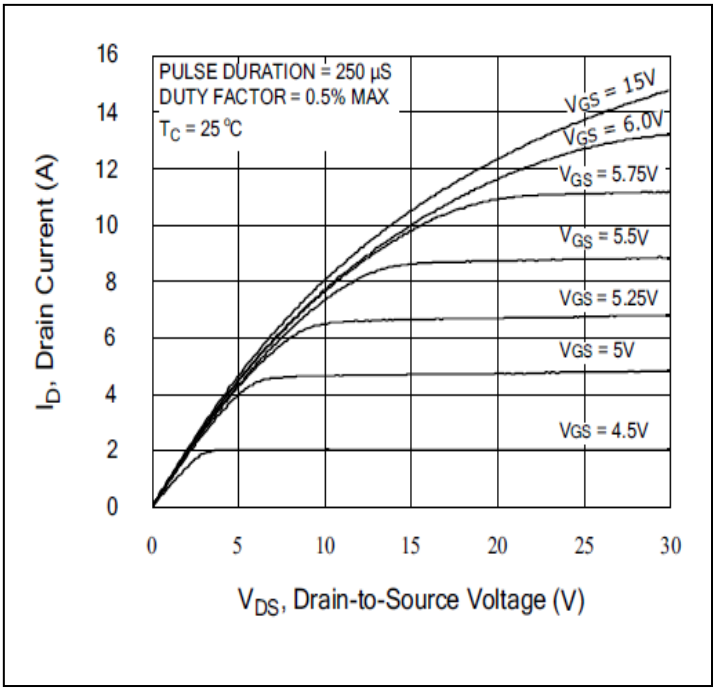


Figure 1: Typical Output Characteristics

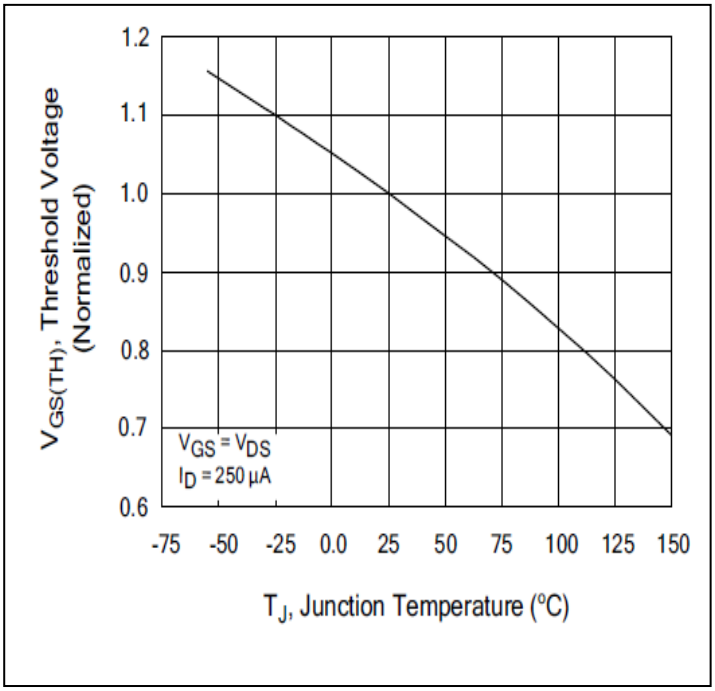


Figure 2. Gate to source cut-off voltage

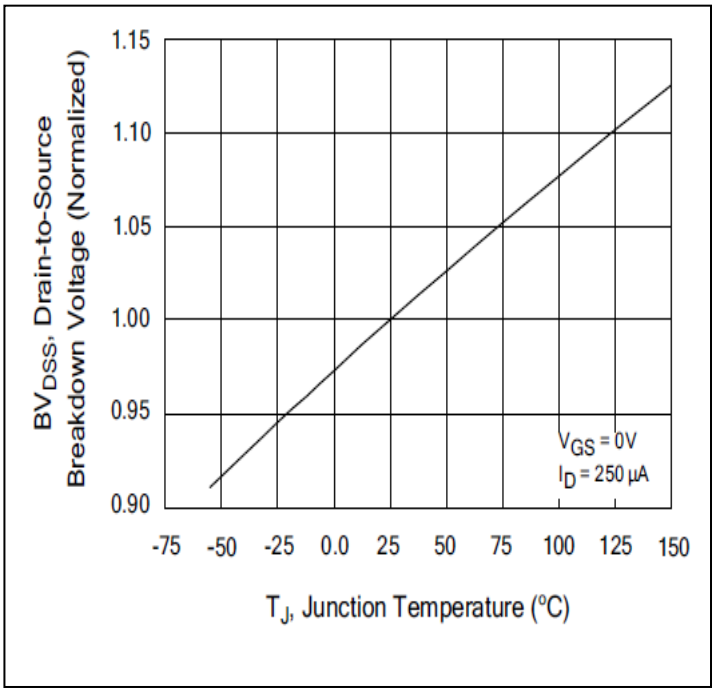


Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

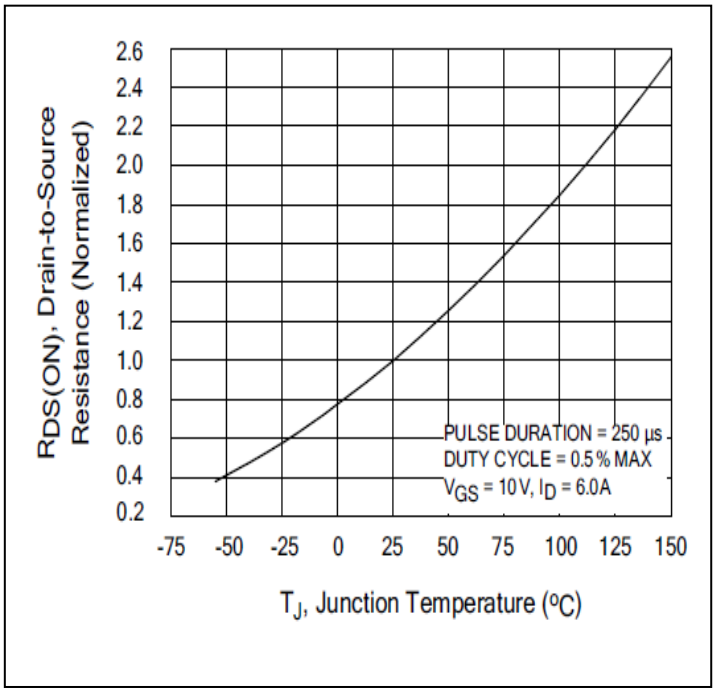


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical electrical and thermal characteristics

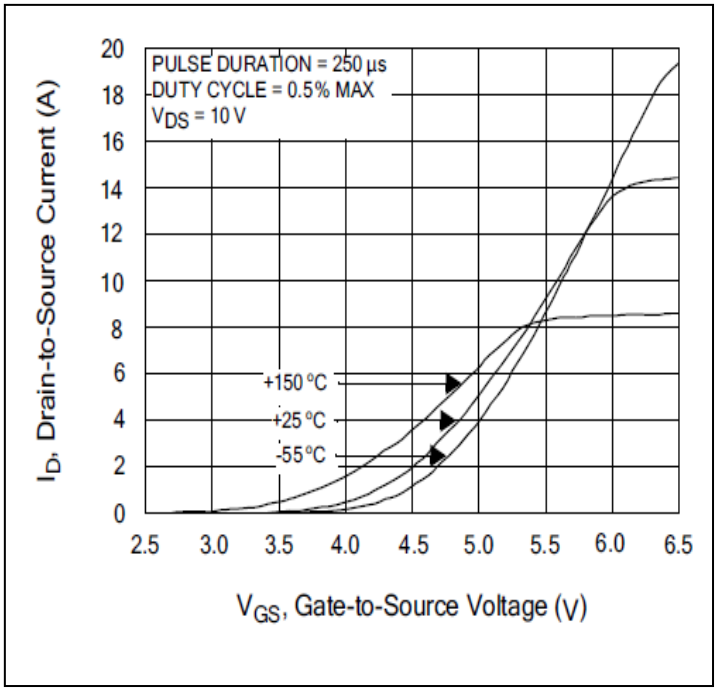


Figure 5: Typical Transfer Characteristics

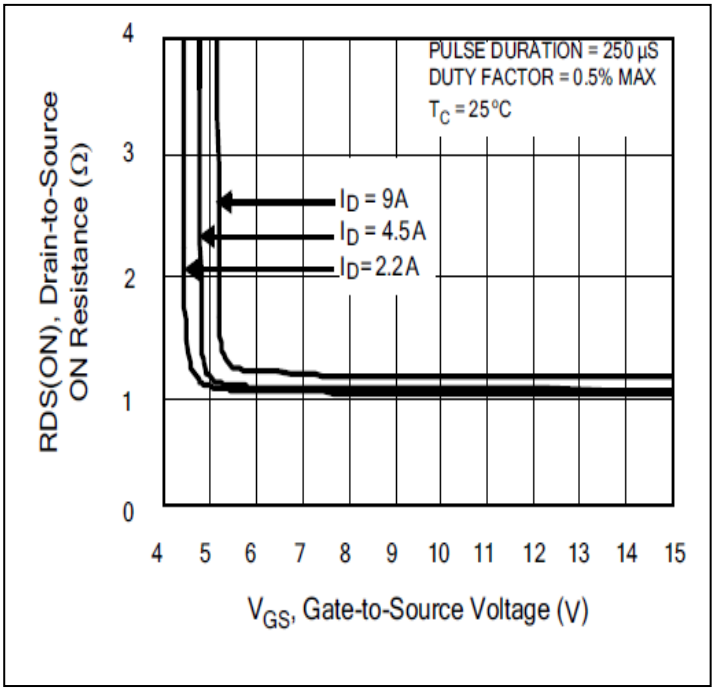


Figure 6. On-Resistance Vs. Gate Voltage and Drain Current

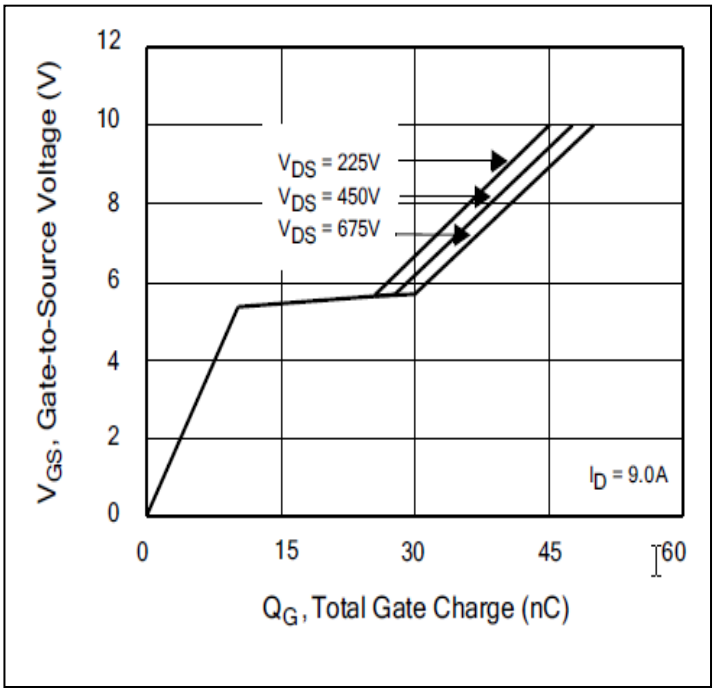


Figure 7. Gate Charge Vs. Drain-to-Source Voltage

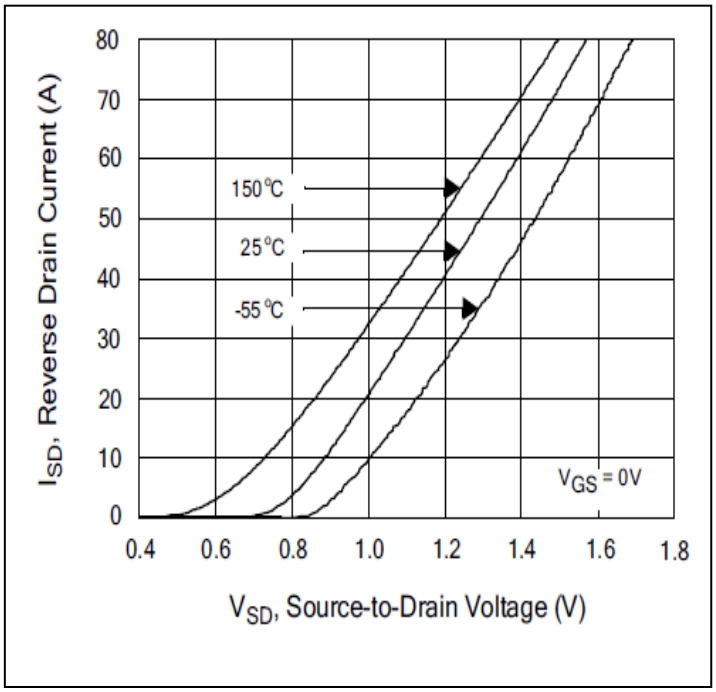


Figure 8: Typical Body Diode Transfer Characteristics

Typical electrical and thermal characteristics

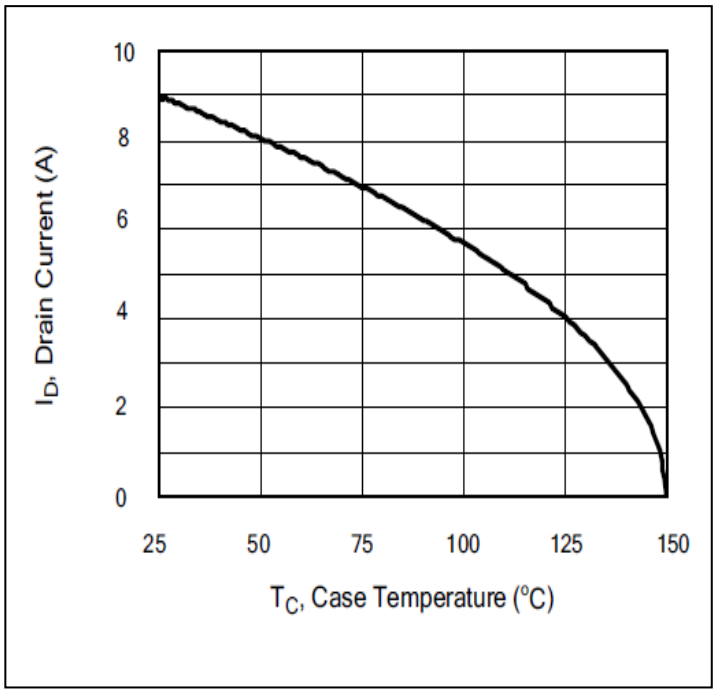


Figure 9. Maximum Drain Current Vs. Case Temperature

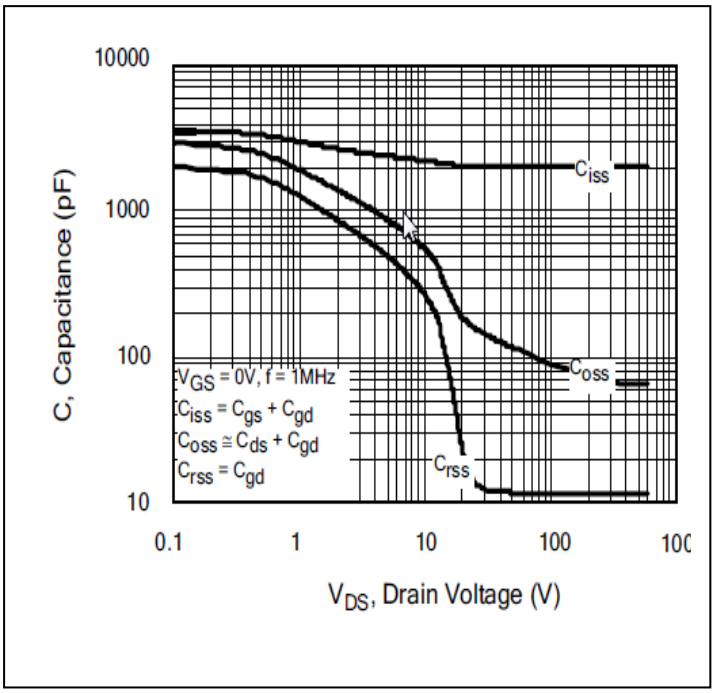


Figure 10.Typical Capacitance Vs. Drain-to-Source Voltage

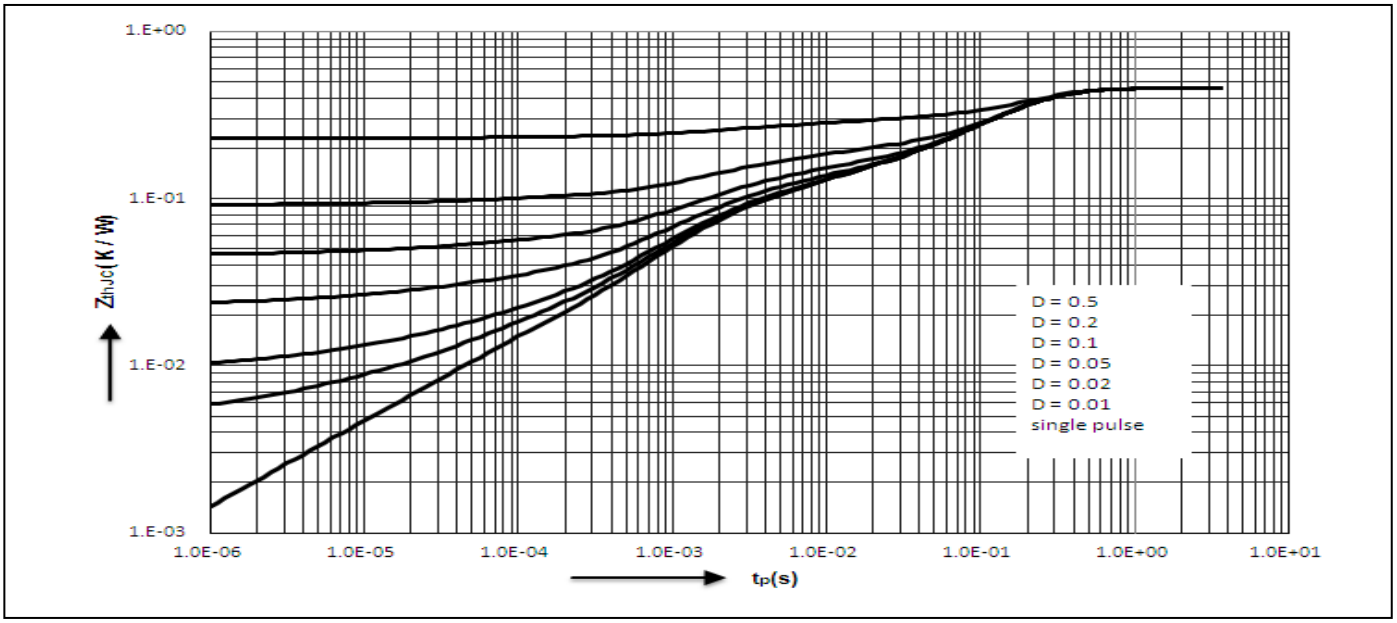
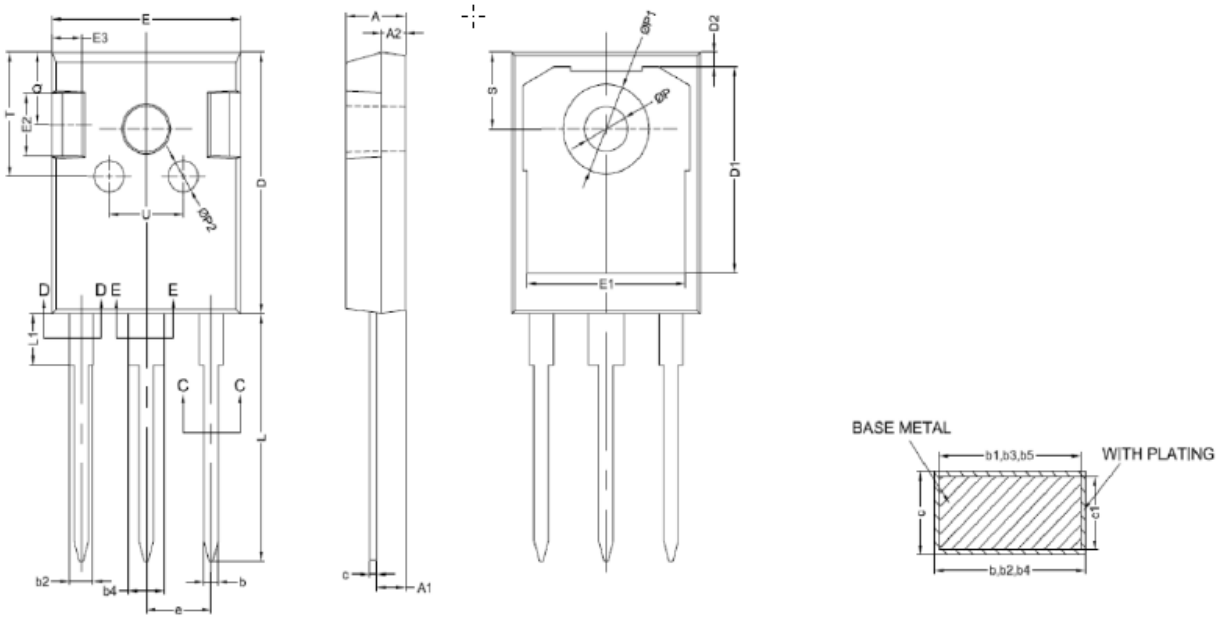


Figure11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data：

TO247 PACKAGE OUTLINE DIMENSION



Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
A	4.900	5.000	5.100	0.193	0.197	0.201
A1	2.300	2.405	2.510	0.091	0.095	0.099
A2	1.900	2.000	2.100	0.075	0.079	0.083
b	1.160	-	1.260	0.046	-	0.050
b1	1.150	1.185	1.220	0.045	0.047	0.048
b2	1.960	-	2.060	0.077	-	0.081
b3	1.950	1.985	2.020	0.077	0.078	0.080
b4	2.960	-	3.060	0.117	-	0.120
b5	2.950	2.985	3.020	0.116	0.118	0.119
c	0.590	-	0.660	0.023	-	0.026
c1	0.580	0.600	0.620	0.023	0.024	0.024
D	20.900	21.000	21.100	0.823	0.827	0.831
D1	16.250	16.550	16.850	0.640	0.652	0.663
D2	1.050	1.200	1.350	0.041	0.047	0.053
E	15.700	15.800	15.900	0.618	0.622	0.626
E1	13.100	13.300	13.500	0.516	0.524	0.531
E2	4.900	5.000	5.100	0.193	0.197	0.201
E3	2.400	2.500	2.600	0.094	0.098	0.102
e		5.44BSC			0.214BSC	
L	19.800	19.950	20.100	0.780	0.785	0.791
L1	-	-	4.300	-	-	0.169
P	3.500	3.600	3.700	0.138	0.142	0.146
P1	-	-	7.400	-	-	0.291
P2	2.400	2.500	2.600	0.094	0.098	0.102
Q	5.600	-	6.000	0.220	-	0.236
S		6.15BSC			0.242BSC	
T	9.800	-	10.200	0.386	-	0.402
U	6.000	-	6.400	0.236	-	0.252

Ordering and Marking Information

Device Marking: SSF9N90ZH

Package (Available)

TO247

Operating Temperature Range

C : -55 to 150 ºC

Devices per Unit

Package Type	Units/ Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO247	30	8	240	5	1200

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	T_j=125℃ to 150℃ @ 80% of Max V_{DSS}/V_{CES}/VR	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	T_j=150℃@ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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