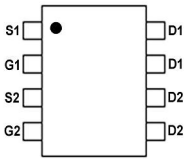
SSF2122E

20V Dual N-Channel MOSFET

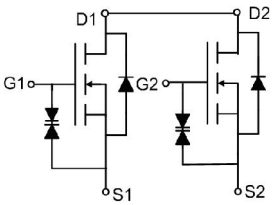
Main Product Characteristics

V_{DSS}	20V
R_{DS}(on)	15.2mohm(typ.)
I_D	7A ①

DFN 3x3-8L



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
- Lead free product

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.

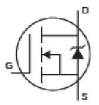
Absolute Max Rating

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V(Silicon Limited)	7 ①	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V	5 ①	
I_{DM}	Pulsed Drain Current ②	42	
P_D @TC = 25°C	Power Dissipation	1.4	W
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Electrical Characteristics @T_A=25℃ unless otherwise specified

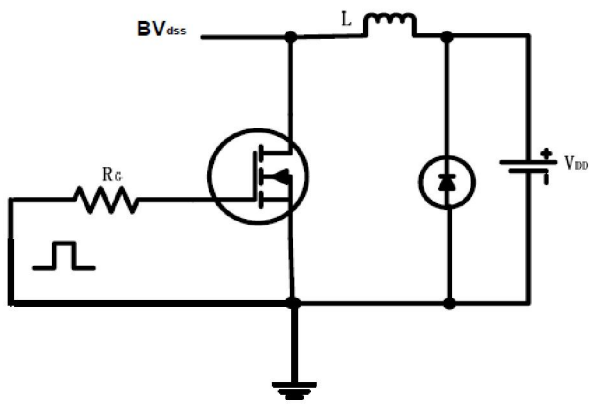
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	20	—	—	V	V_{GS} = 0V, I_D = 250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	15.2	23	mΩ	V_{GS}=4.5V,I_D = 4A
		—	15.9	24		V_{GS}=4V,I_D=4A
		—	17.6	30		V_{GS}=3.1V,I_D=4A
		—	20.8	35		V_{GS}=2.5V,I_D=2A
$V_{GS(th)}$	Gate threshold voltage	0.5	—	1	V	V_{DS} = V_{GS}, I_D = 250μA
		—	0.30	—		T_J = 125℃
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	V_{DS} = 20V,V_{GS} = 0V
I_{GSS}	Gate-to-Source forward leakage	—	—	10	μA	V_{GS} =8V
		—	—	-10		V_{GS} = -8V
Q_g	Total gate charge	—	24.1	—	nC	I_D = 7A,
Q_{gs}	Gate-to-Source charge	—	1.4	—		V_{DS}=10V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	4.2	—		V_{GS} = 10V
$t_{d(on)}$	Turn-on delay time	—	5.3	—	nS	V_{GS}=4V, V_{DS} =10V, R_L=2.86Ω,I_D = 3.5A
t_r	Rise time	—	18.2	—		
$t_{d(off)}$	Turn-Off delay time	—	25	—		
t_f	Fall time	—	3	—		
C_{iss}	Input capacitance	—	681	—	pF	V_{GS} = 0V,
C_{oss}	Output capacitance	—	124	—		V_{DS} =10V,
C_{rss}	Reverse transfer capacitance	—	117	—		f = 1MHz

Source-Drain Ratings and Characteristics

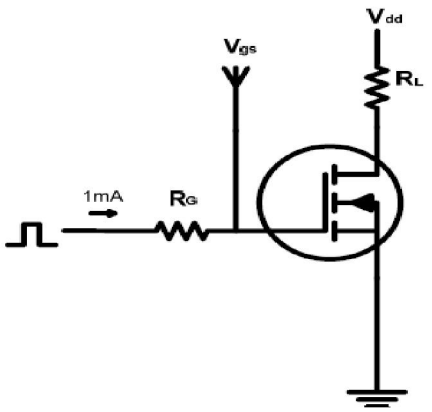
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	7 ①	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	42	A	
V_{SD}	Diode Forward Voltage	—	0.7	1.2	V	I_S=1.5A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	—	34.3	—	nS	T_J = 25°C, I_F =7A, di/dt = 100A/μs
Q_{rr}	Reverse Recovery Charge	—	10.2	—	nC	

Test Circuits and Waveforms

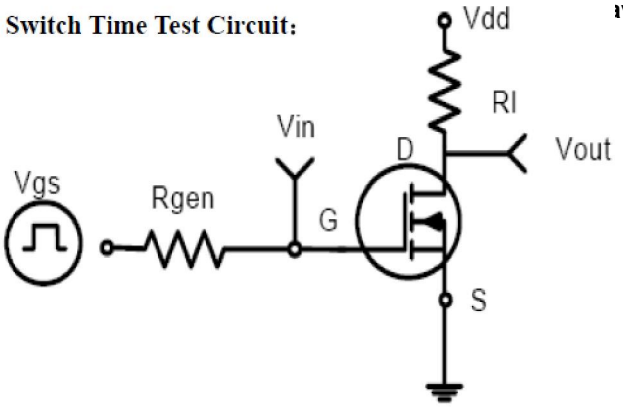
EAS test circuits:



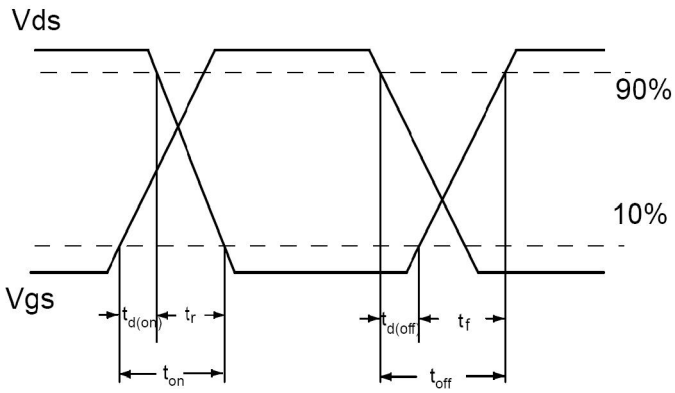
Gate charge test circuit:



Switch Time Test Circuit:



ıveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature.

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

③The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

④These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C.

Typical Electrical and Thermal Characteristics

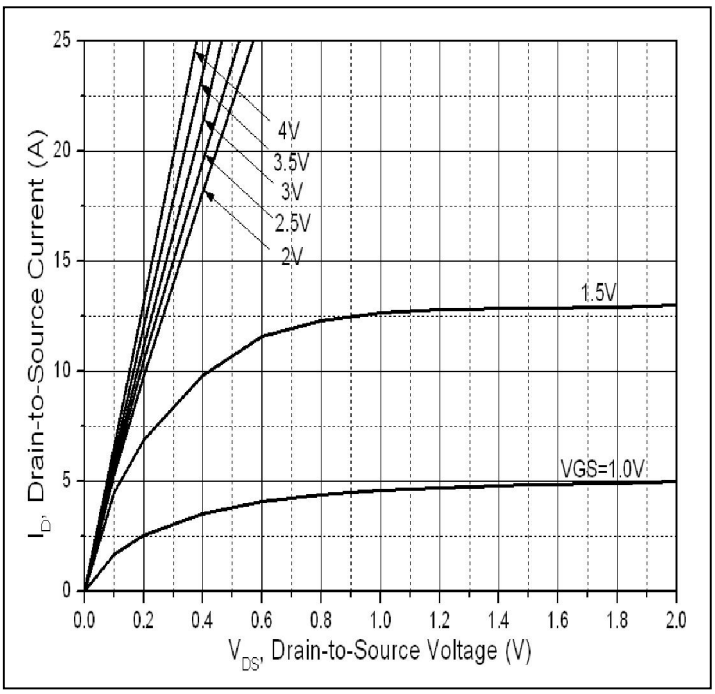


Figure 1: Typical Output Characteristics

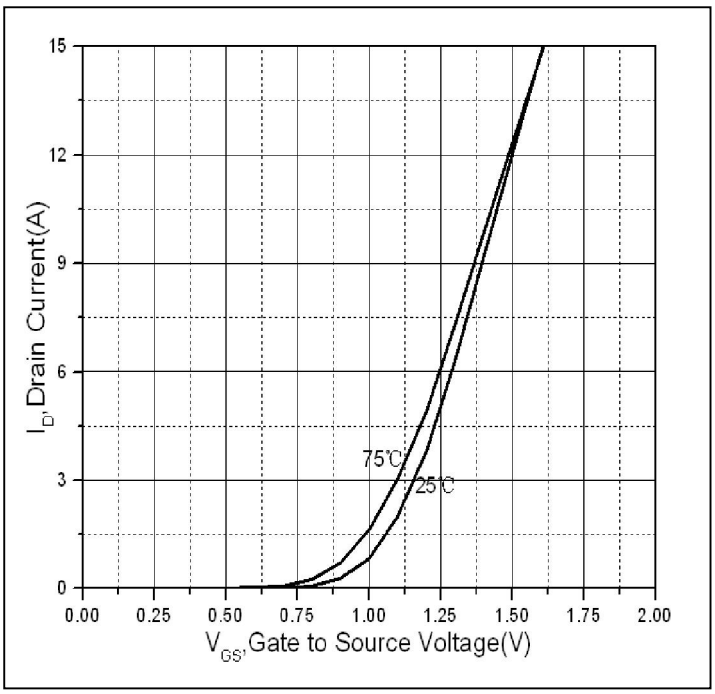


Figure 2. Typical Transfer Characteristics

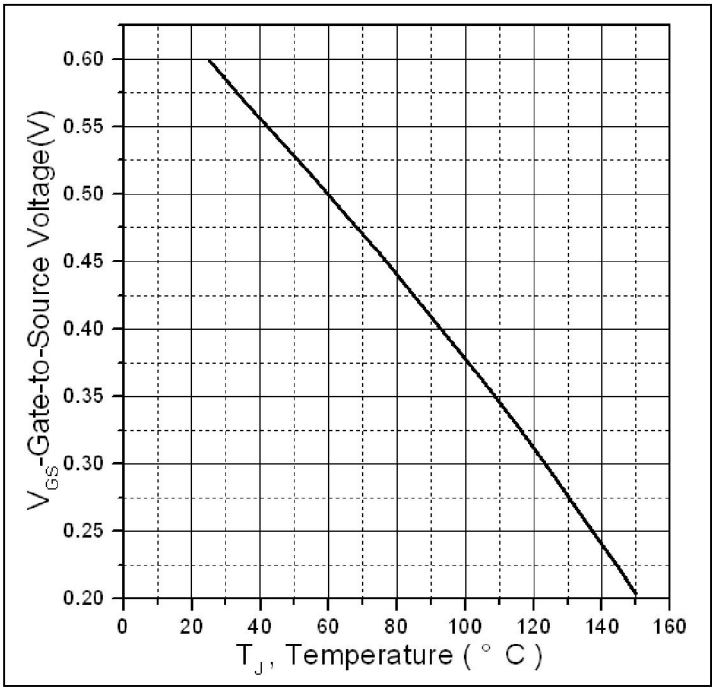


Figure 3. Gate to source cut-off oltage

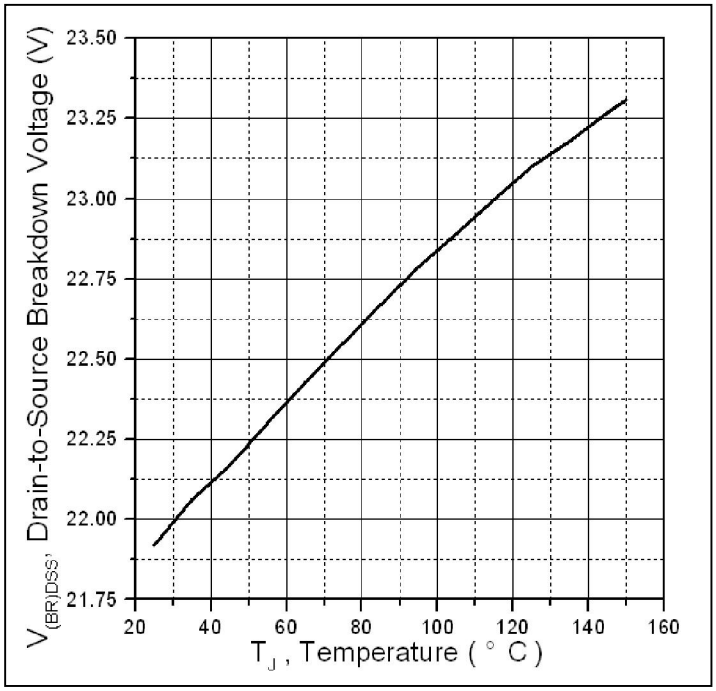


Figure 4: Drain-to-Source Breakdown Voltage vs. Temperature

Typical Electrical and Thermal Characteristics

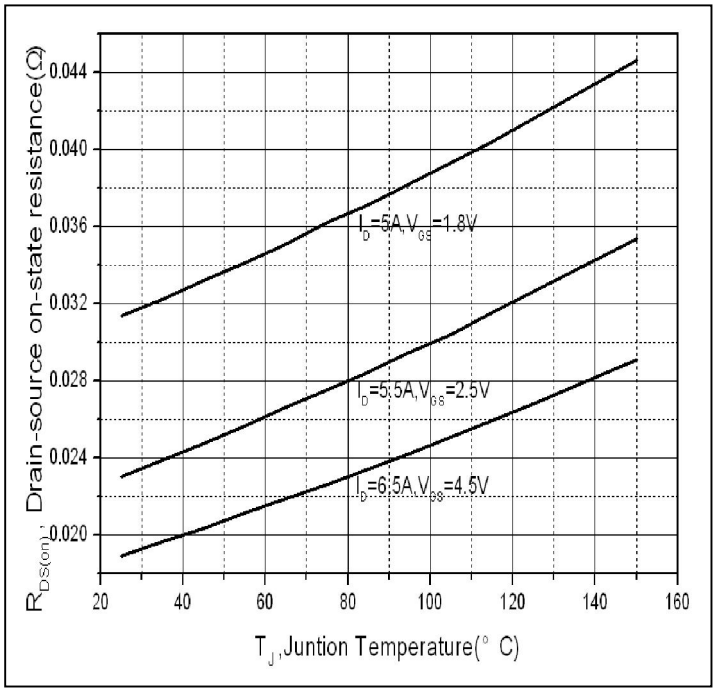


Figure 5. Normalized On-Resistance Vs. Case Temperature

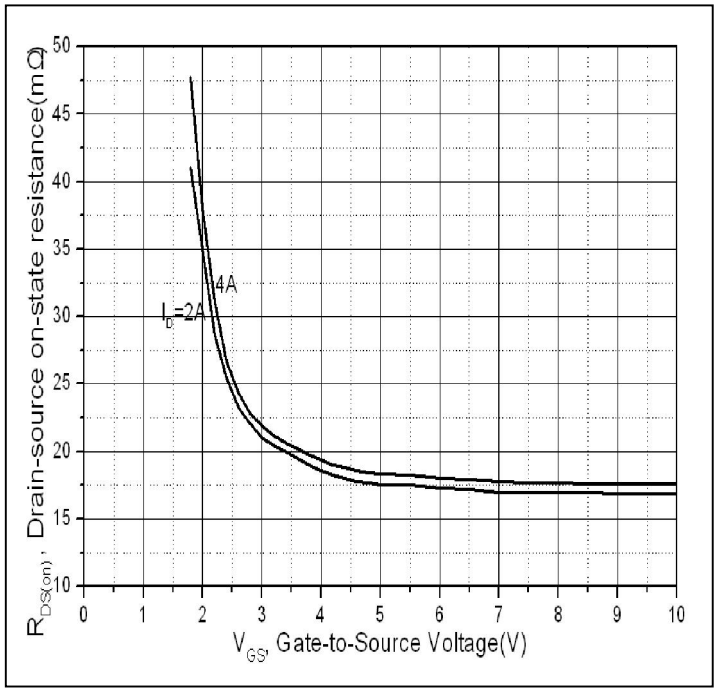


Figure 6. Normalized On-Resistance Vs. Gate to Source voltage

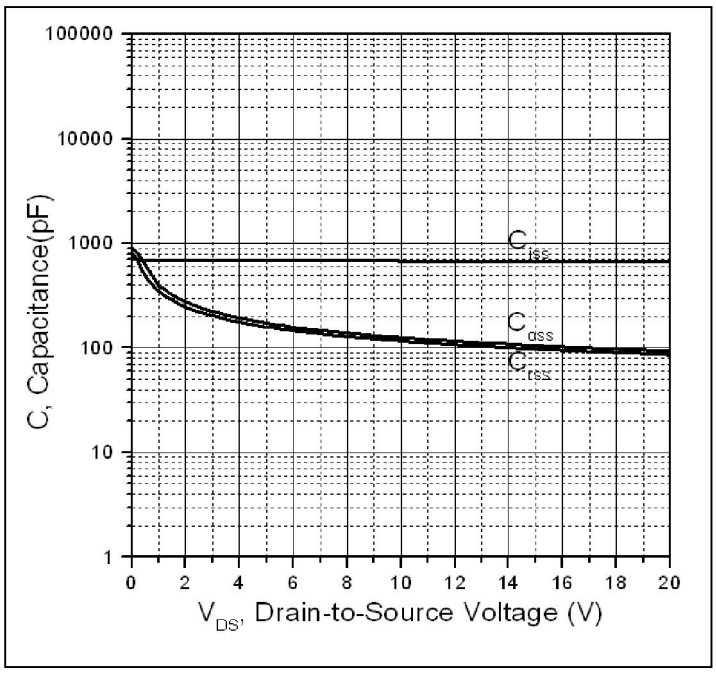


Figure 7. Typical Capacitance Vs. Drain-to-Source Voltage

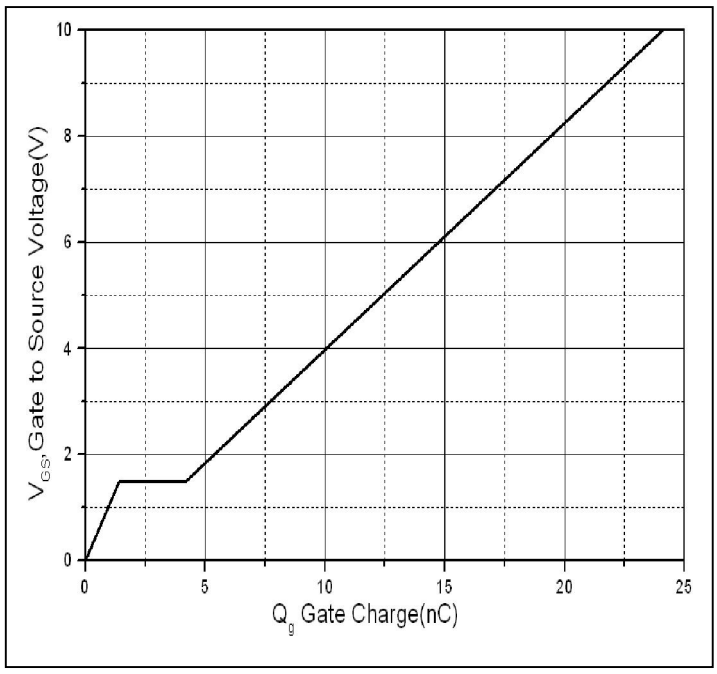


Figure 8. Gate-Charge Characteristics

Typical Electrical and Thermal Characteristics

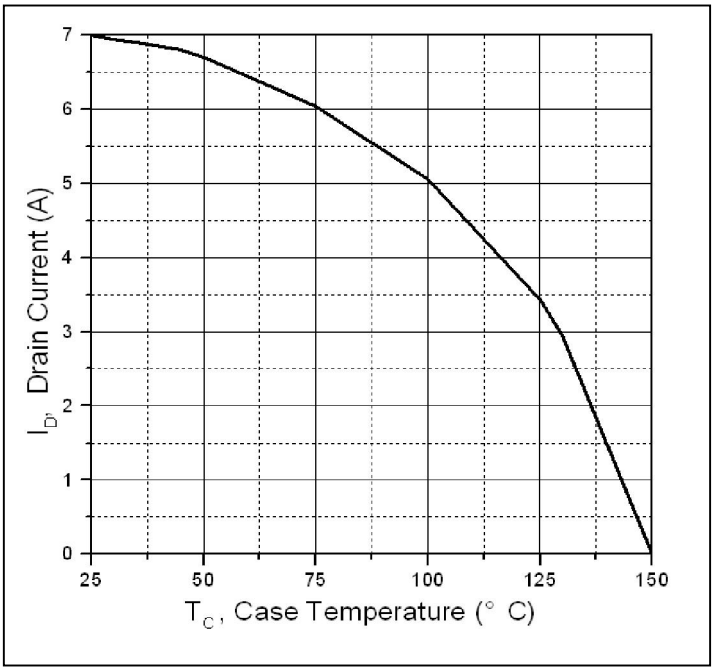


Figure9. Maximum Drain Current Vs. Case Temperature

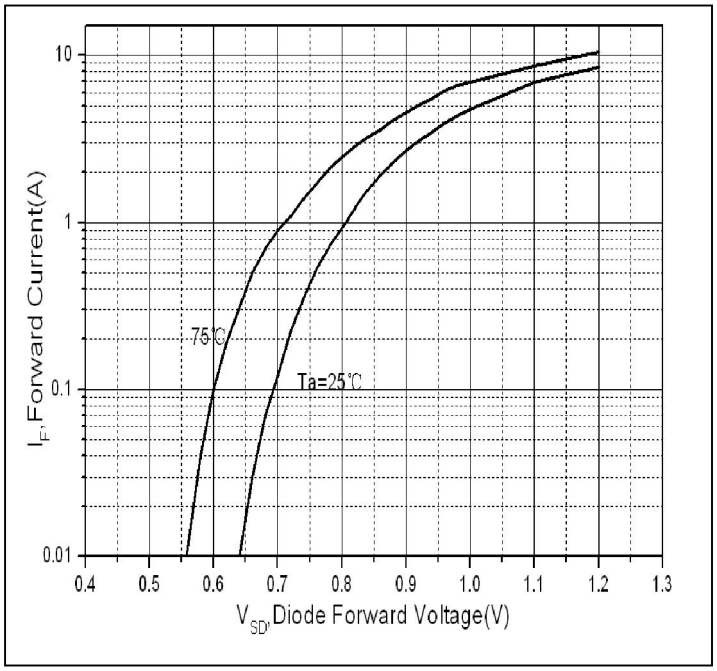


Figure10. Forward Current Vs. Diode Forward Voltage

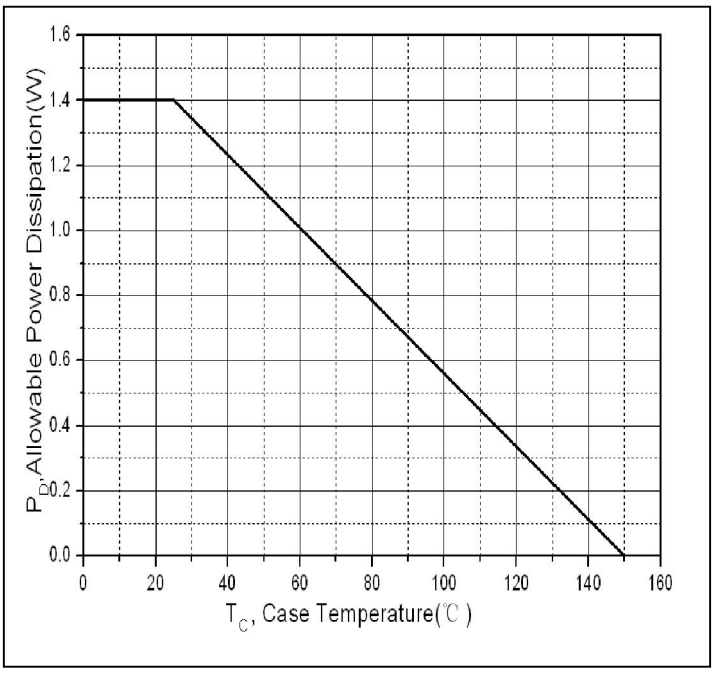
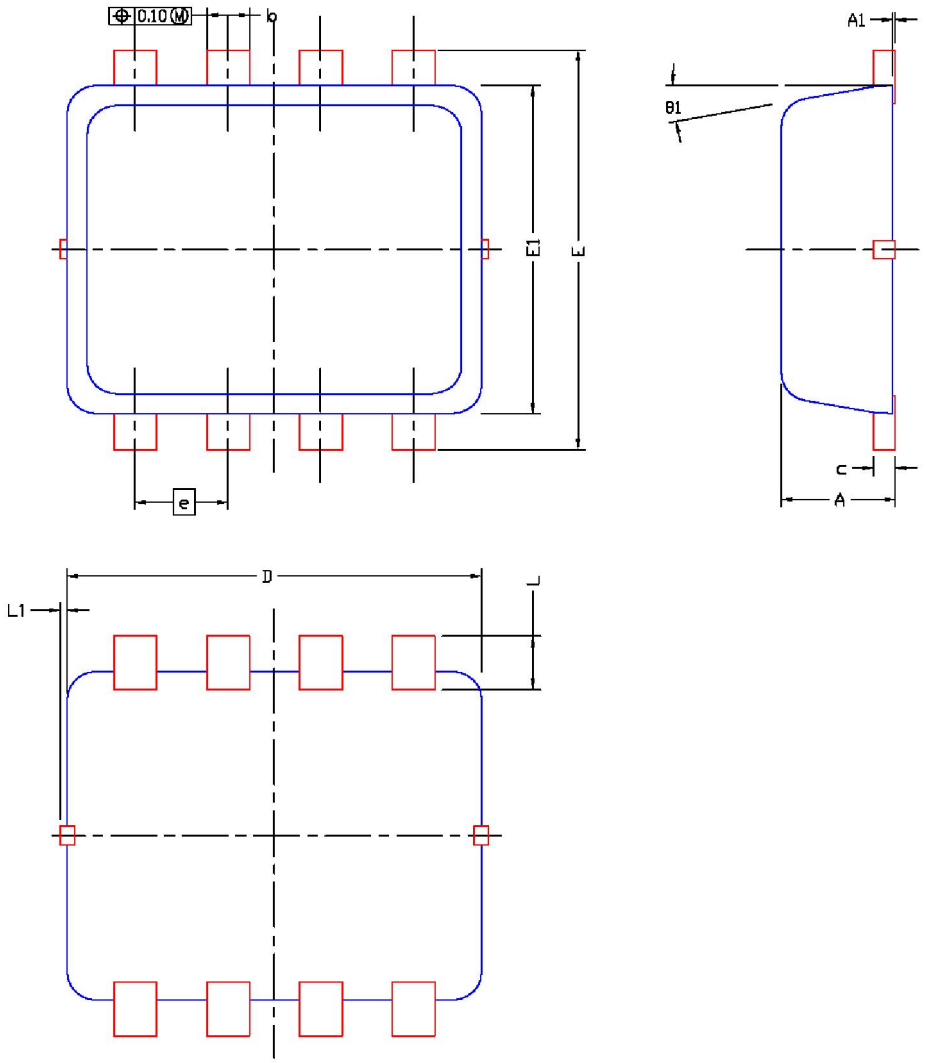


Figure11. Power Dissipation Vs. Case Temperature

Mechanical Data

DFN3×3-8L PACKAGE OUTLINE DIMENSION:



Dim.	Millimeters			Inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.700	0.80	0.900	0.0276	0.0315	0.0354
A1	0.00	---	0.05	0.000	---	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.08	0.152	0.25	0.003	0.006	0.010
D	2.90 BSC			0.114 BSC		
E	2.80 BSC			0.110 BSC		
E1	2.30 BSC			0.091 BSC		
e	0.65 BSC			0.026 BSC		
L	0.20	0.375	0.450	0.008	0.0148	0.0177
L1	0	---	0.100	0	---	0.004
θ1	0°	10°	12°	0°	10°	12°

Ordering and Marking Information

Device Marking: 2122E

Package (Available)
DFN 3x3-8L
Operating Temperature Range
C : -55 to 150 °C

Devices per Unit

Package Type	Units/ Tape	Tapes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
DFN 3x3-8L	3000pcs	4pcs	12000pcs	4pcs	48000pcs

Reliability Test Program

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