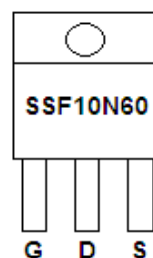
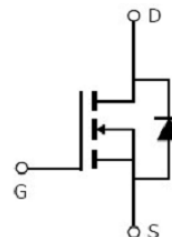


Main Product Characteristics:

V_{DSS}	600V
$R_{DS(on)}$	0.69Ω (typ.)
I_D	10A


TO-220

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°C operating temperature


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 ^①	10	A
I_D @ TC = 100°C	Continuous Drain Current, V_{GS} @ 10V ^①	6	
I_{DM}	Pulsed Drain Current ^②	40	
P_D @TC = 25°C	Power Dissipation ^③	156	W
	Linear Derating Factor	1.25	W/°C
V_{DS}	Drain-Source Voltage	600	V
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy @ L=14.2mH	641	mJ
I_{AS}	Avalanche Current @ L=14.2mH	9.5	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

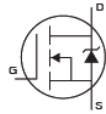
Thermal Resistance

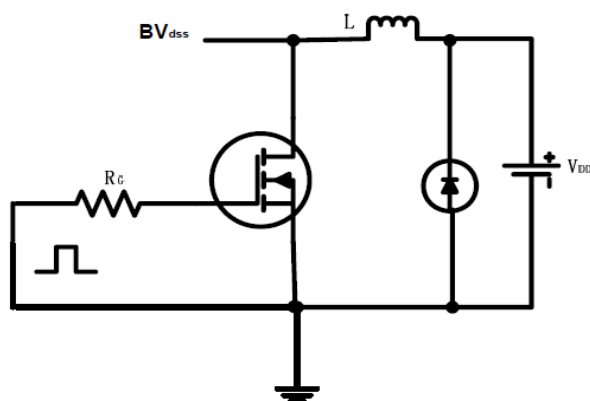
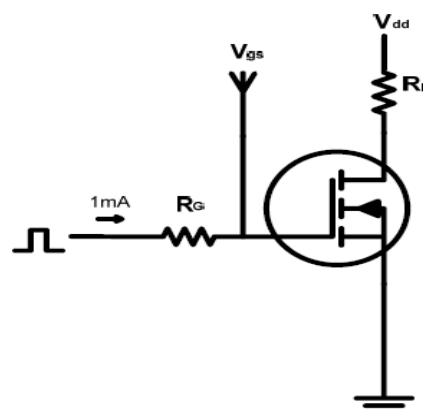
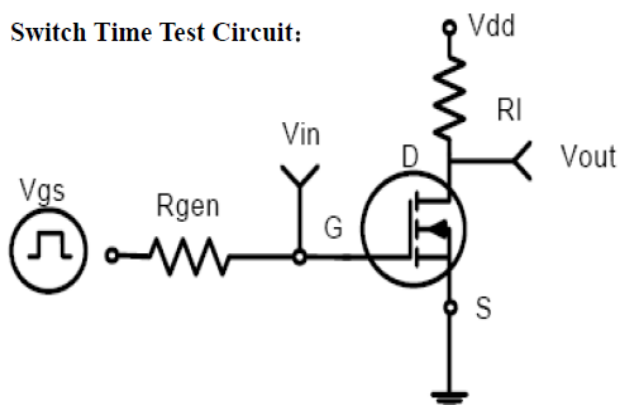
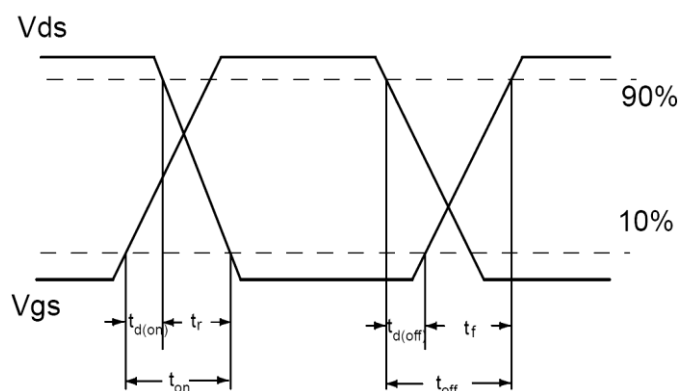
Symbol	Characterizes	Typ.	Max.	Units
R _{θJC}	Junction-to-case ^③	—	0.8	°C/W
R _{θJA}	Junction-to-ambient (t ≤ 10s) ^④	—	62	°C/W
	Junction-to-Ambient (PCB mounted, steady-state) ^④	—	40	°C/W

Electrical Characterizes @T_A=25°C unless otherwise specified

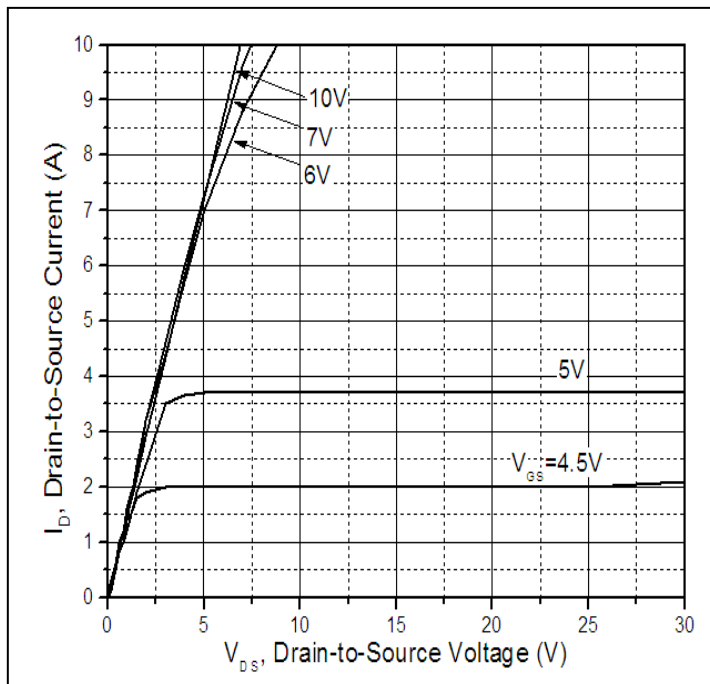
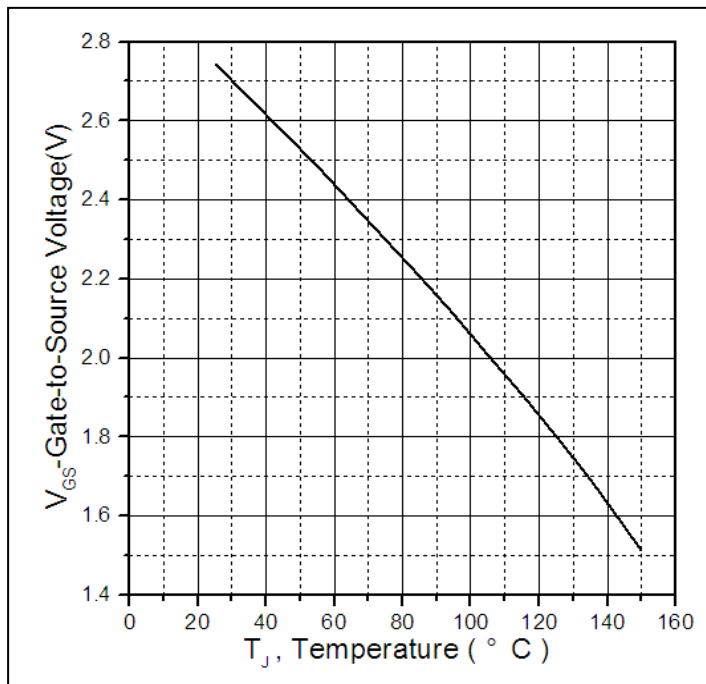
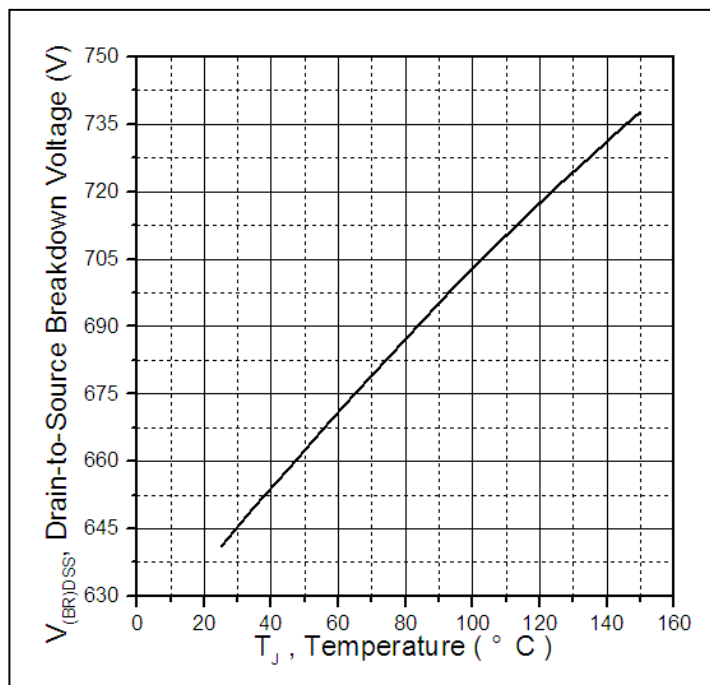
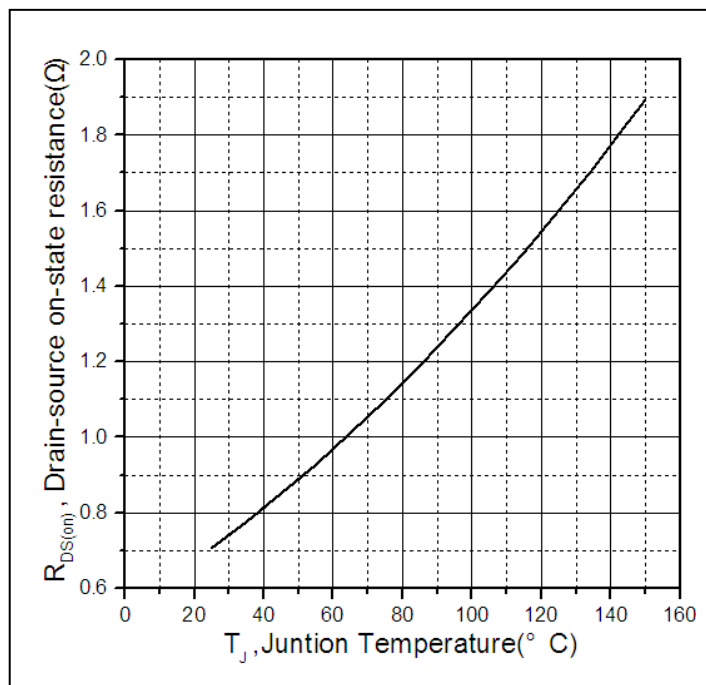
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)DSS}	Drain-to-Source breakdown voltage	600	—	—	V	V _{GS} = 0V, I _D = 250μA
R _{DS(on)}	Static Drain-to-Source on-resistance	—	0.69	0.8	Ω	V _{GS} =10V, I _D = 5A T _J = 125°C
		—	1.60	—		
V _{GS(th)}	Gate threshold voltage	2	—	4	V	V _{DS} = V _{GS} , I _D = 250μA T _J = 125°C
		—	1.8	—		
I _{DSS}	Drain-to-Source leakage current	—	—	1	μA	V _{DS} = 600V, V _{GS} = 0V T _J = 125°C
		—	—	50		
I _{GSS}	Gate-to-Source forward leakage	—	—	100	nA	V _{GS} = 30V V _{GS} = -30V
		—	—	-100		
Q _g	Total gate charge	—	25.09	—	nC	I _D = 9.5A, V _{DS} =480V, V _{GS} = 10V
Q _{gs}	Gate-to-Source charge	—	7.74	—		
Q _{gd}	Gate-to-Drain("Miller") charge	—	8.87	—		
t _{d(on)}	Turn-on delay time	—	20.2	—	ns	V _{GS} =10V, V _{DS} =320V, R _L =33.8Ω, R _{GEN} =25Ω I _D =9.5A
t _r	Rise time	—	37.2	—		
t _{d(off)}	Turn-Off delay time	—	65.2	—		
t _f	Fall time	—	40.2	—		
C _{iss}	Input capacitance	—	1257	—	pF	V _{GS} = 0V V _{DS} = 25V f = 1MHz
C _{oss}	Output capacitance	—	159	—		
C _{rss}	Reverse transfer capacitance	—	1.36	—		

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	10	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode)	—	—	40	A	
V _{SD}	Diode Forward Voltage	—	0.92	1.4	V	I _S =10A, V _{GS} =0V
t _{rr}	Reverse Recovery Time	—	745	—	ns	T _J = 25°C, I _F =9.5A,
Q _{rr}	Reverse Recovery Charge	—	4841	—	nC	di/dt = 100A/μs

Test circuits and Waveforms
EAS test circuits:

Gate charge test circuit:

Switch Time Test Circuit:

Switch Waveforms:

Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The 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 $T_A = 25^\circ C$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)} = 150^\circ C$.

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

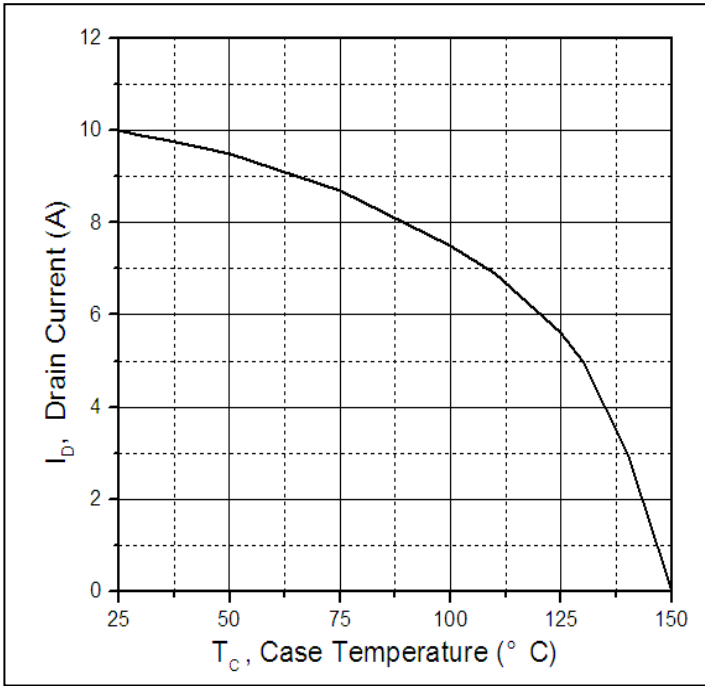


Figure 5. Maximum Drain Current Vs. Case Temperature

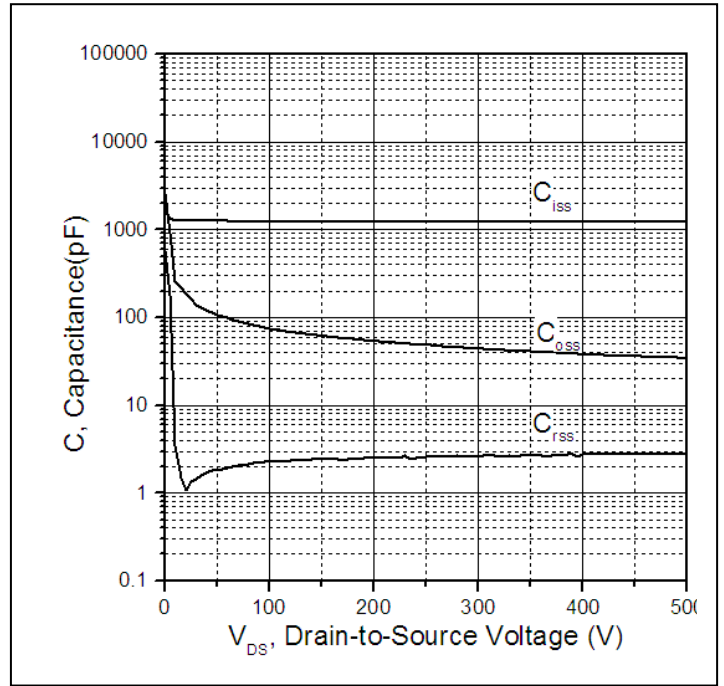


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

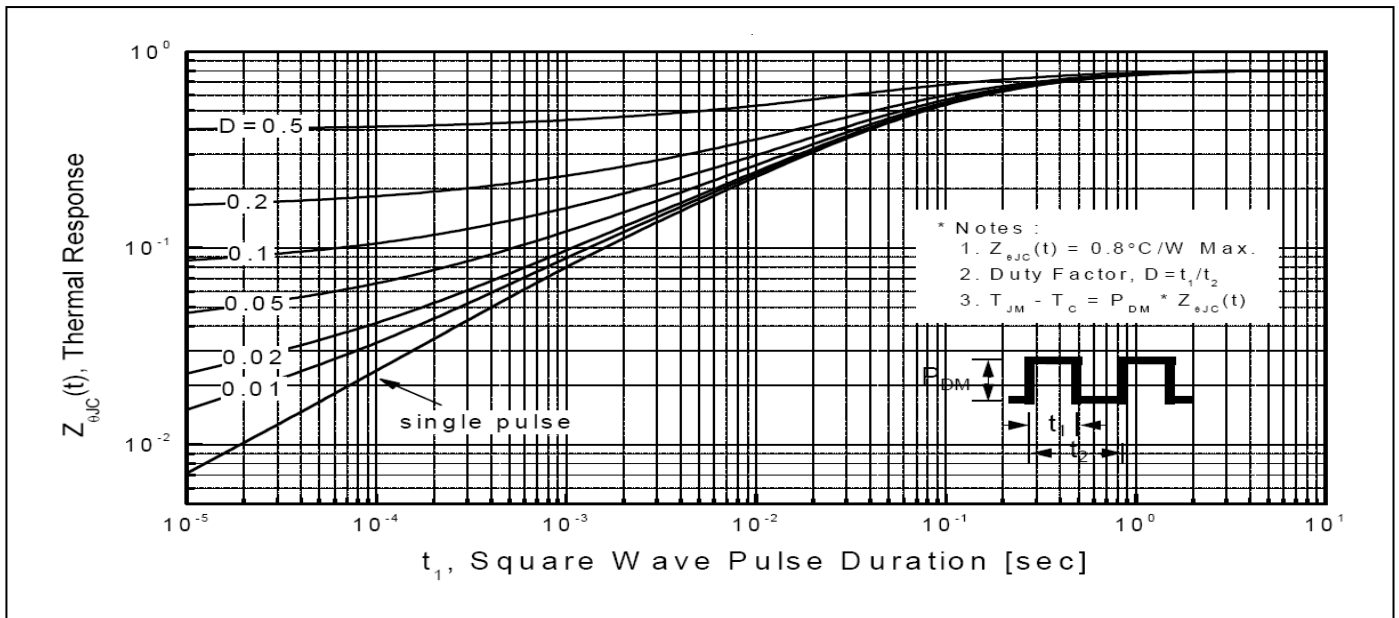
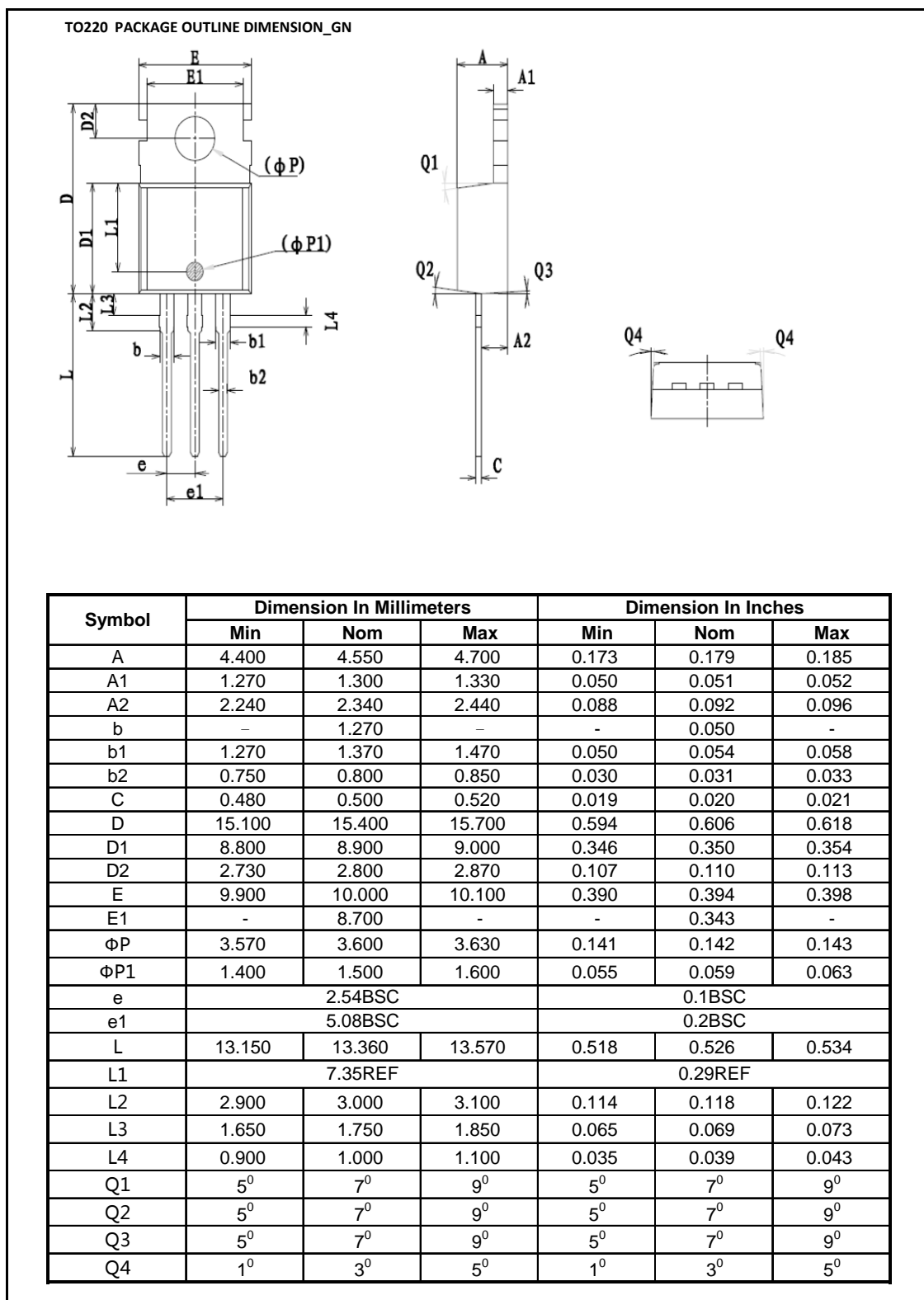


Figure7. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Mechanical Data:


Ordering and Marking Information
Device Marking: SSF10N60

Package (Available)
TO220
Operating Temperature Range
C : -55 to 150 °C

Devices per Unit

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO220	50	20	1000	6	6000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 150°C @ 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)	$T_j=150^{\circ}\text{C}$ @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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