

Description

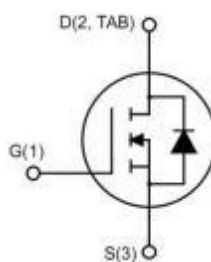
Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low RDS(on)
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

- EV motor drive
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Solar inverters
- EV charging



Ordering Information

Part Number	Marking	Package	Packaging
JX3S0040120M	JX3S0040120M	TO-247	Tube

Absolute Maximum Ratings(Tc=25C)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	1200	V
I _D	Drain Current(continuous)at Tc=25C	60	A
I _D	Drain Current(continuous)at Tc=100C	48	A
I _{DM}	Drain Current (pulsed)	100	A
V _{GS}	Gate-Source Voltage	-10/+22	V
P _D	Power Dissipation Tc = 25°C	325	W
T _J , T _{stg}	Junction and Storage Temperature Range	-55 to +150	°C

Electrical Characteristics(T_J = 25C unless otherwise specified)
Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV _{DS}	Drain-source Breakdown Voltage	I _D =250uA, V _{GS} =0V	1200			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =1200V, V _{GS} =0V, T _J =250C			100	uA
I _{GSS}	Gate-body Leakage Current	V _{DS} =0V ; V _{GS} =-10 to 20V			250	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =10mA	2	3	4	V
V _{GS(on)}	Recommended turn-on Voltage	Static		20		V
V _{GS(off)}	Recommended turn-off Voltage			-5		V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} =20V, I _D =20A		45	52	mΩ
		V _{GS} =20V, I _D =20A T _J =150C		72		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS}=1000V, f=100kHz,$ $V_{AC}=25mV$		3239		pF
C_{oss}	Output Capacitance			112		pF
C_{rss}	Reverse Transfer Capacitance			6		pF
g_{fs}	Transconductance	$V_{DS}=20V, I_D=20A$		23		S
E_{OSS}	Coss Stored Energy	$V_{DS}=1000V, f=100kHz$		63		μJ
E_{ON}	Turn-On Energy (Body Diode)	$V_{DS}=800V, V_{GS}=-5/20V,$ $I_D=20A, L=100\mu H$ $T_J=150^\circ C$		1695		μJ
E_{OFF}	Turn-Off Energy (Body Diode)			306		μJ
Q_g	Total Gate Charge	$V_{DS}=800V, V_{GS}=-5V/20V,$ $I_D=20A$		125		nC
Q_{gs}	Gate-source Charge			32		nC
Q_{gd}	Gate-Drain Charge			33		nC
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25mV$		3.5		Ω
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=800V, V_{GS}=-5V/20V,$ $I_D=20A, L=100\mu H$ $R_{ext}=2.5\Omega$		17		ns
t_r	Rise Time			66		ns
$t_{d(off)}$	Turn-off Delay Time			28		ns
t_f	Fall Time			14		ns

Typical Performance-Reverse Diode($T_J = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FSD}	Forward Voltage	$V_{GS}=0V, I_F=20A, T_J=25^\circ C$		5	6	V
		$V_{GS}=0V, I_F=20A, T_J=150^\circ C$		4.5	6	V
I_S	Continuous Diode Forward Current	$V_{GS}=0V, T_C=25^\circ C$		55		A
t_{rr}	Reverse Recovery Time	$V_{GS}=-5V, I_F=20A,$ $V_R=800V, di/dt=900$ $A/\mu s, T_J=150^\circ C$		50		nS
Q_{rr}	Reverse Recovery Charge			712		nC
I_{rrm}	Peak Reverse Recovery Current			19		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.38	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^\circ C/W$

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of $T_J(max)=150^\circ C$

Electrical Characteristics

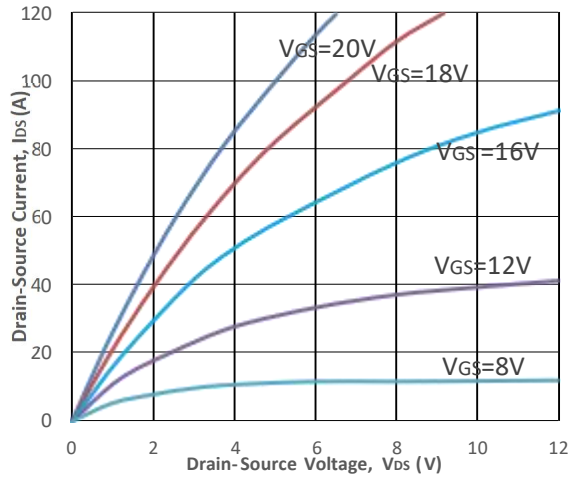
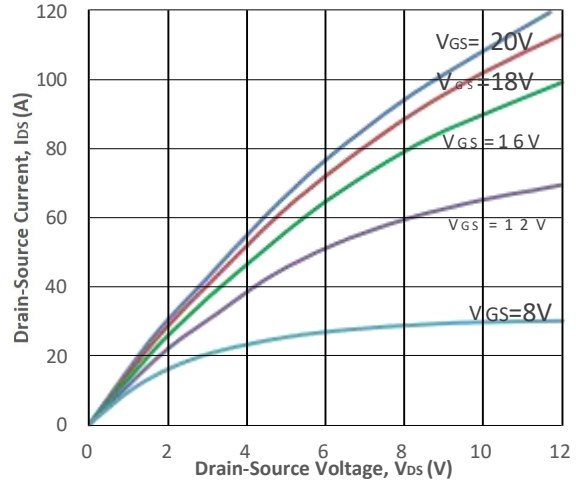
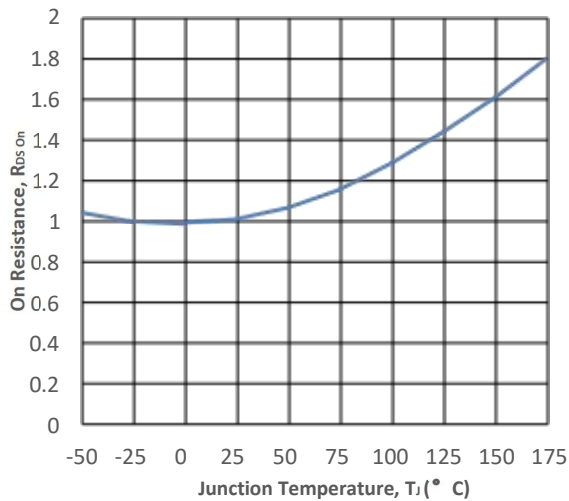
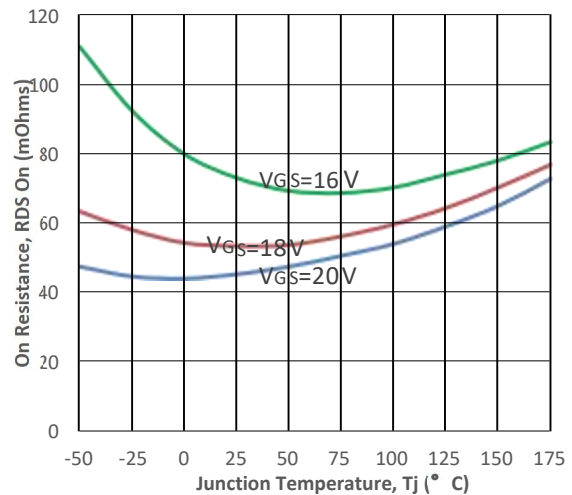
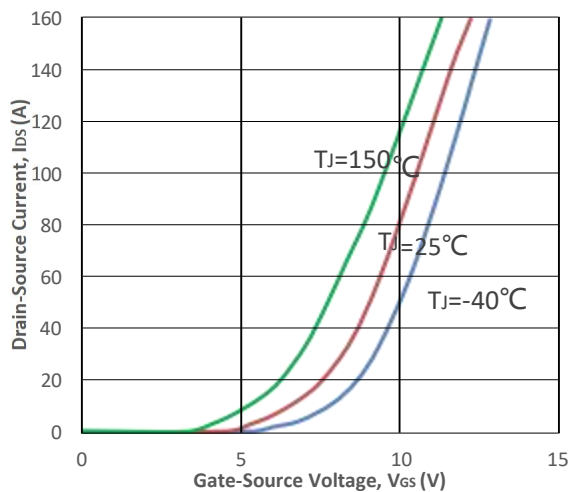
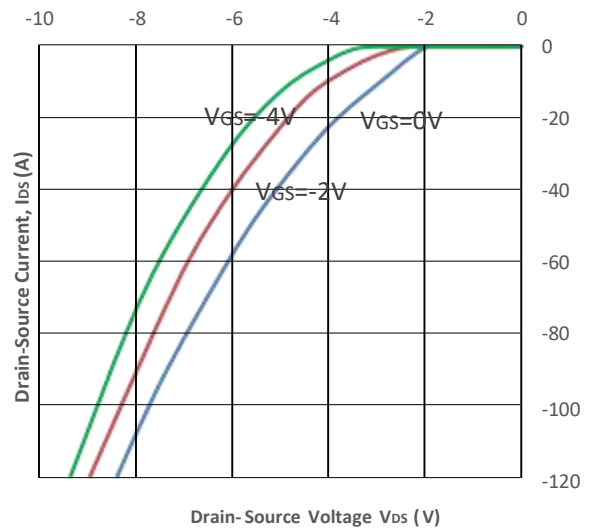
Fig1. Output characteristics ($T_J = 25^\circ\text{C}$)

Fig2. Output characteristics ($T_J = 150^\circ\text{C}$)

Fig3. Normalized On-Resistance vs. Temperature

Fig4. On-Resistance vs. Temperature

Fig5. Transfer Characteristic

Fig6. Body Diode Characteristic at 25°C


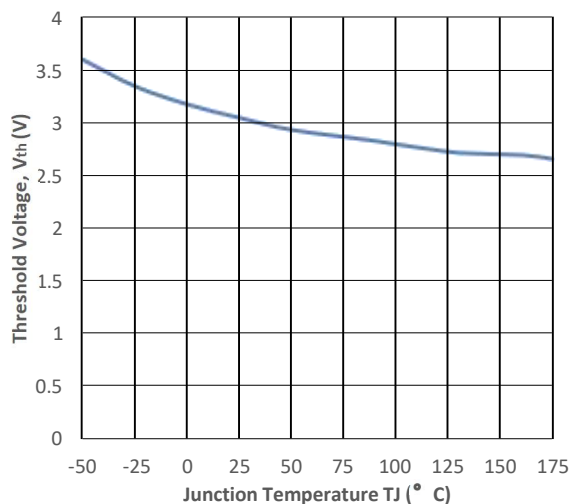
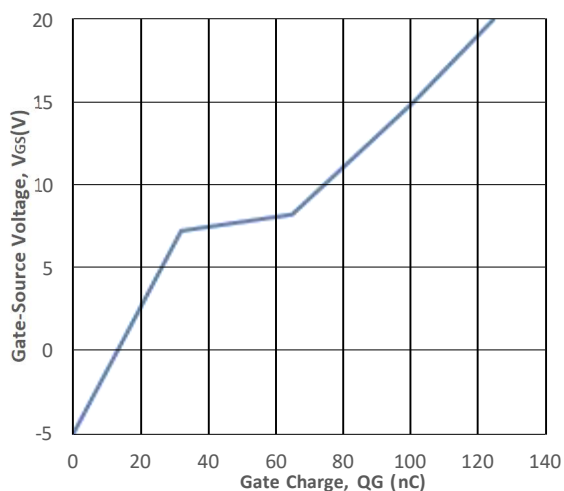
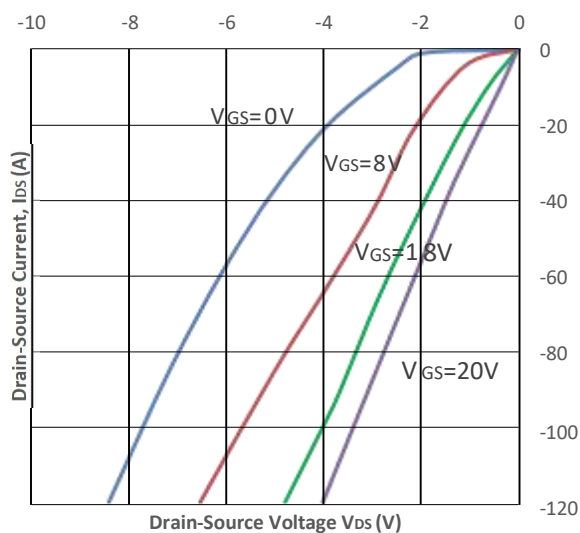
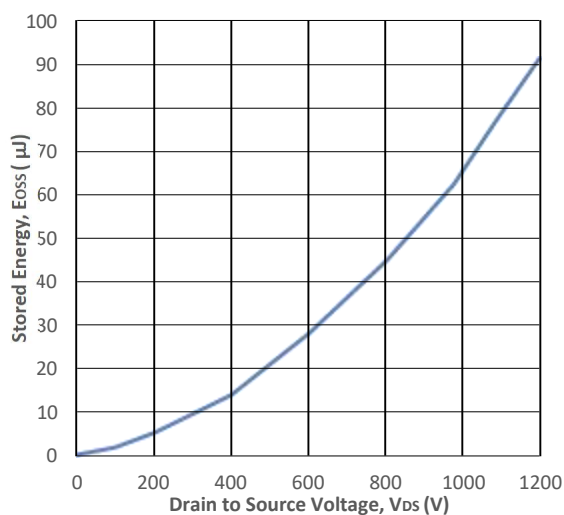
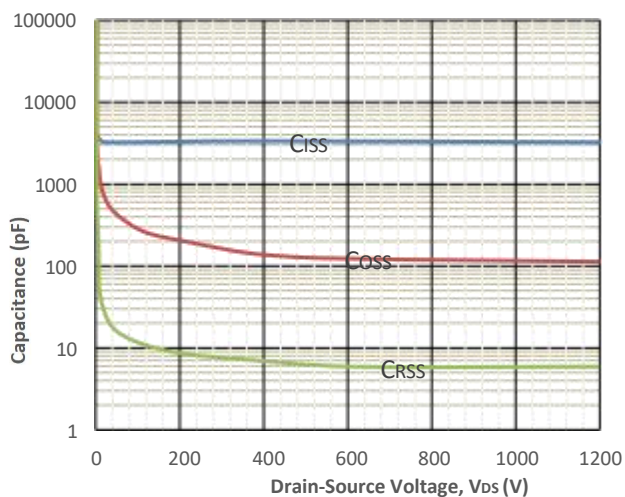
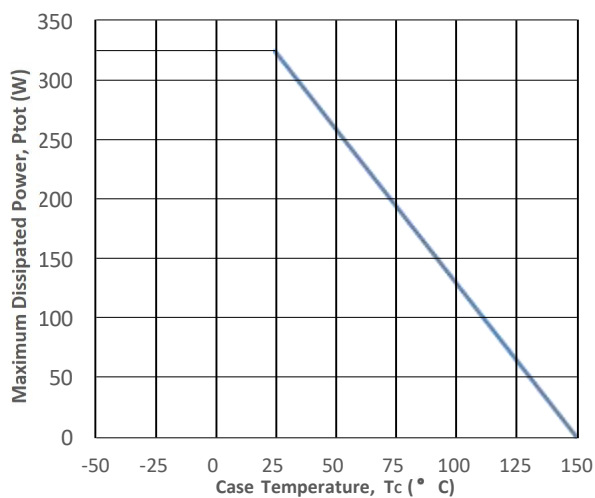
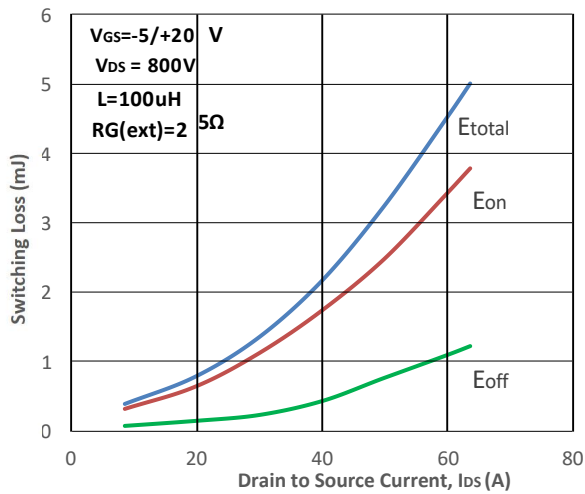
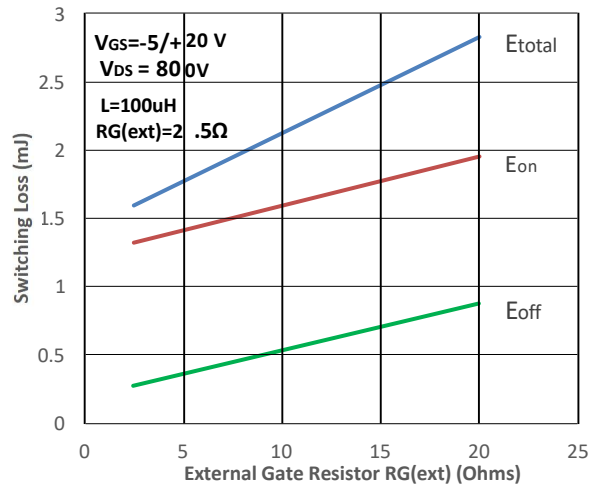
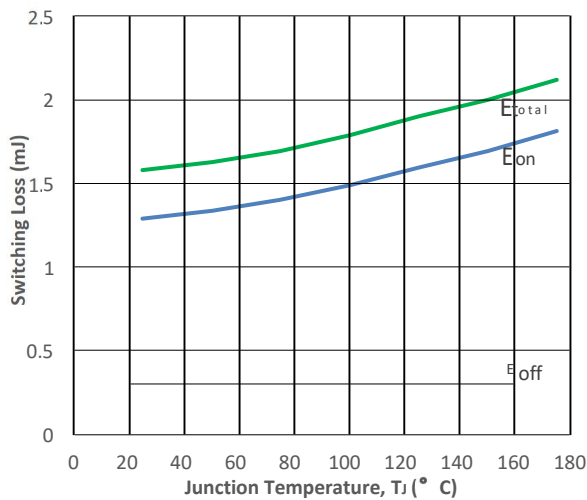
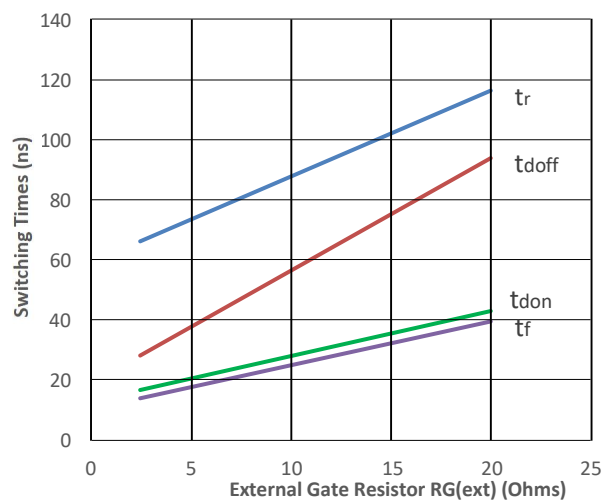
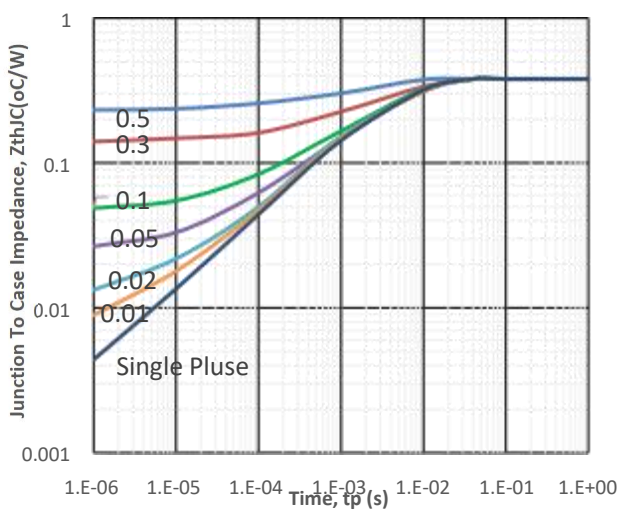
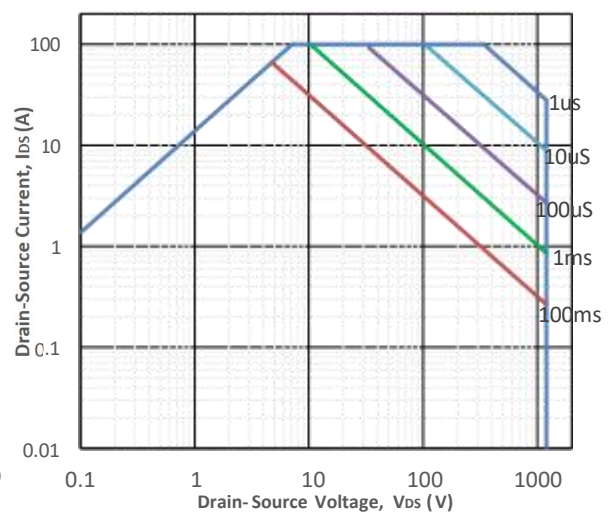
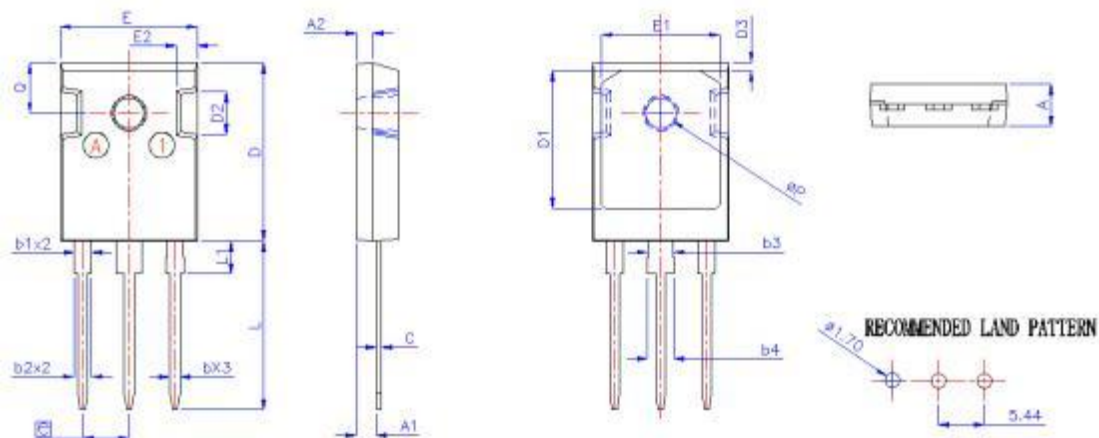
Fig7.Threshold Voltage vs. Temperature

Fig8. Gate Charge Characteristics

Fig9. 3rd Quadrant Characteristic at 25 $^{\circ}$ C

Fig10. Output Capacitor Stored Energy

Fig11. Capacitances vs. Drain-Source

Fig12. Max Power Dissipation Derating Vs T_c


Fig13. Switching Energy vs. Drain Current

Fig14. Switching Energy vs. $R_{G(ext)}$

Fig15. Switching Energy vs. Temperature

Fig16. Switching Times vs. $R_{G(ext)}$

Fig17. Transient Thermal Impedance

Fig18. Safe Operating Area


Package Drawing:

Dimensions (UNIT: mm)

SYMBDLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.90	5.00	5.10	0.193	0.197	0.201
A1	2.31	2.42	2.52	0.091	0.095	0.099
A2	1.90	2.00	2.10	0.075	0.079	0.083
b	1.16	1.22	1.27	0.046	0.048	0.050
b1	1.96	2.02	2.07	0.079	0.080	0.081
b2	2.03	2.07	2.10	0.080	0.0815	0.083
b3	2.96	3.02	3.07	0.117	0.119	0.121
b4	3.03	3.07	3.1	0.119	0.120	0.122
C	0.59	0.62	0.66	0.023	0.024	0.026
D	20.90	21.00	21.10	0.823	0.827	0.831
D1	15.96	16.26	16.56	0.628	0.640	0.652
D2	4.3			4.3		
D3	0.8	0.95	1.1	0.031	0.037	0.043
e	5.44 BSC			0.214 BSC		
E	15.95	16.15	16.35	0.628	0.636	0.644
E1	13.82	14.02	14.26	0.544	0.552	0.561
E2	4.3			0.169		
L	19.72	19.92	20.12	0.776	0.784	0.792
L1	---	---	3.86	---	---	0.152
Q	5.95 BSC			0.234BSC		
ØP	3.55	3.60	3.70	0.140	0.142	0.146