

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.

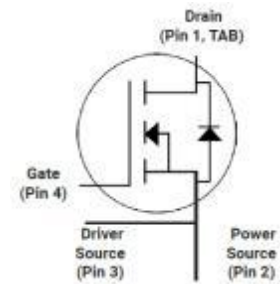
Features

- 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 Charging
- DC/DC Converters
- Switch Mode Power Supplies
- UPS
- Solar PV inverters



Ordering Information

Part Number	Marking	Package	Packaging
JX4S0040R065M	JX4S0040R065M	TO247-4	Tube

Absolute Maximum Ratings(Tc=25C)

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage	650	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)	132	A
V _{GS}	Gate-Source Voltage	-10/+25	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	650			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =650V, V _{GS} =0V, T _J =250C		5	100	μ A
I _{GSS}	Gate-body Leakage Current	V _{DS} =0V ; V _{GS} = -10 to 20V		10	250	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =10mA	2	3	4	V
V _{GSon}	Recommended turn-on Voltage	Static		20		V
V _{GSoff}	Recommended turn-off Voltage			-5		V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} =20V, I _D =15A		38	49	mΩ
		V _{GS} =20V, I _D =15A T _J =150°C		50		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS}=600V, f=1MHz,$ $V_{AC}=25mV$		1866		pF
C_{oss}	Output Capacitance			115		pF
C_{rss}	Reverse Transfer Capacitance			9		pF
g_{fs}	Transconductance	$V_{DS}=20V, I_D=20A$		13		S
E_{oss}	Coss Stored Energy	$V_{DS}=600V, f=1MHz$		22		μJ
E_{on}	Turn-On Energy (Body Diode)	$V_{DS}=400V, V_{GS}=-5V/20V,$ $I_D=20A, L=100\mu H$ $T_J=150^\circ C$		59		μJ
E_{off}	Turn-Off Energy (Body Diode)			15		μJ
Q_g	Total Gate Charge	$V_{DS}=400V, V_{GS}=-5V/20V,$ $I_D=20A$		81		nC
Q_{gs}	Gate-source Charge			21		nC
Q_{gd}	Gate-Drain Charge			21		nC
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz, V_{AC}=25mV$		3.5		Ω
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=400V, V_{GS}=-5V/20V,$ $I_D=20A, L=100\mu H$ $R_{ext}=2.5\Omega$		10		ns
t_r	Rise Time			12		ns
$t_{d(off)}$	Turn-off Delay Time			19		ns
t_f	Fall Time			7		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	$V_{GS}=0V, I_F=7.5A, T_J=25^\circ C$		5.2	6	V
		$V_{GS}=0V, I_F=7.5A, T_J=150^\circ C$		4.8	6	V
I_S	Continuous Diode Forward Current	$V_{GS}=0V, T_C=25^\circ C$		30.5		A
t_{rr}	Reverse Recovery Time	$V_{GS}=-5V, I_F=15A,$ $V_R=400V, T_J=150^\circ C$ $di/dt=2400A/\mu s$		36		nS
Q_{rr}	Reverse Recovery Charge			160		nC
I_{rrm}	Peak Reverse Recovery Current			10.5		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

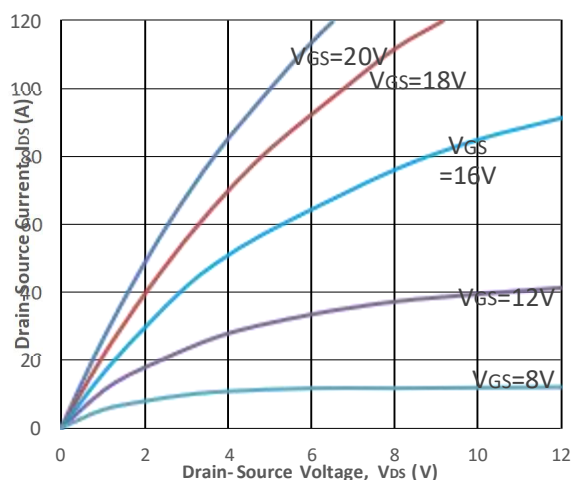
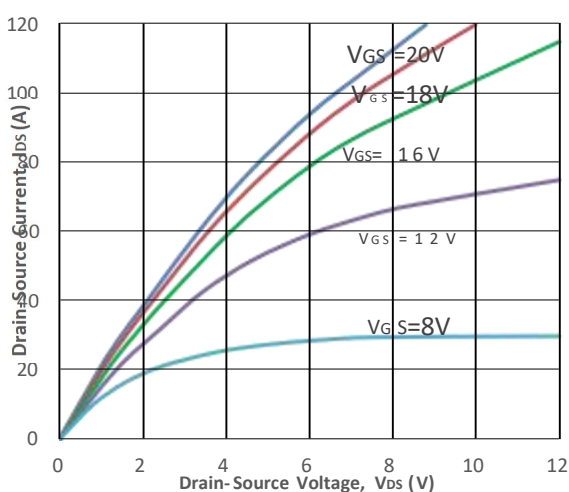
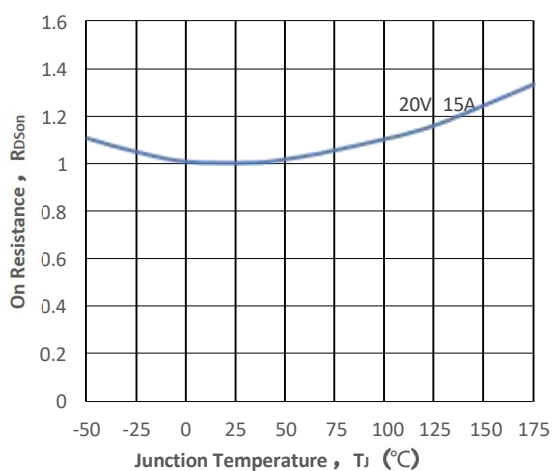
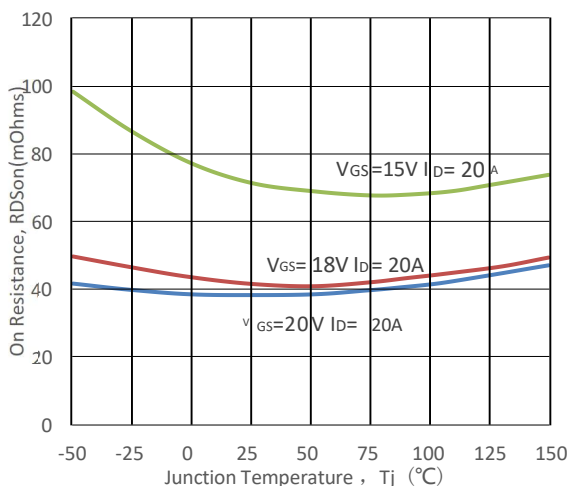
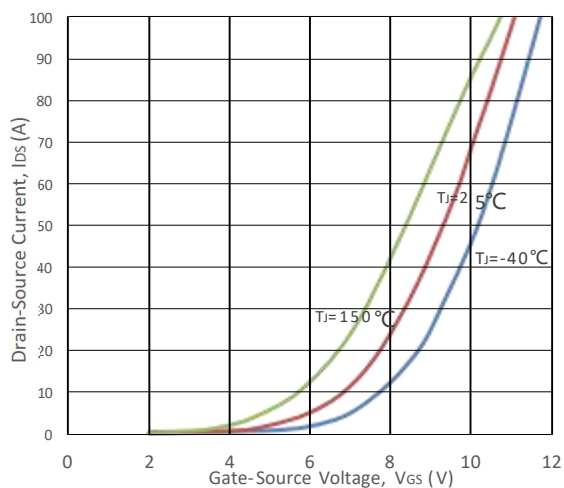
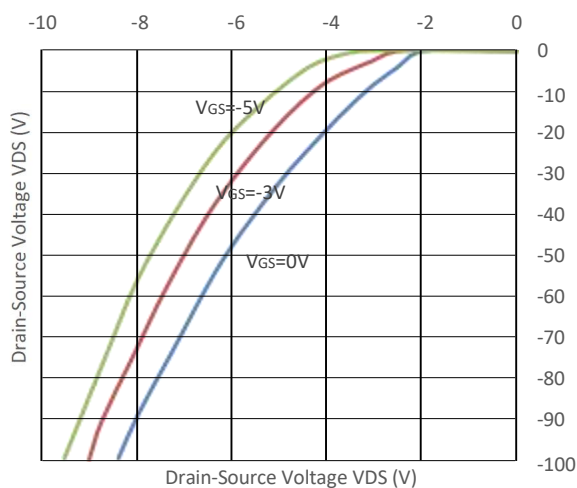
Fig1. Output characteristics ($T_J = 25^\circ\text{C}$)

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


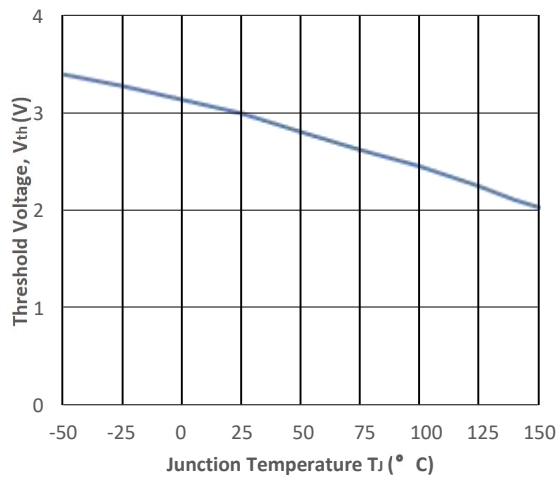
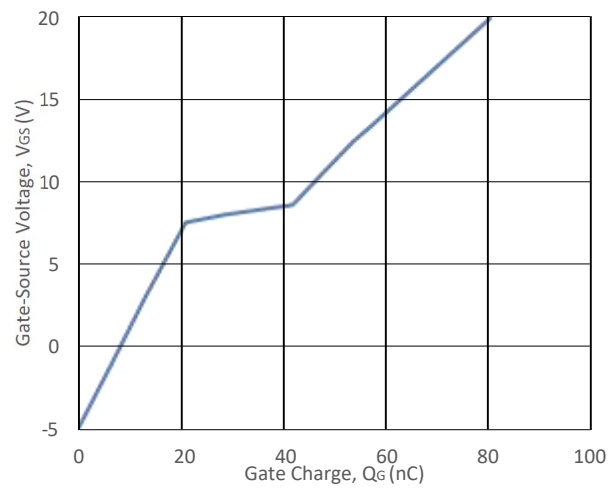
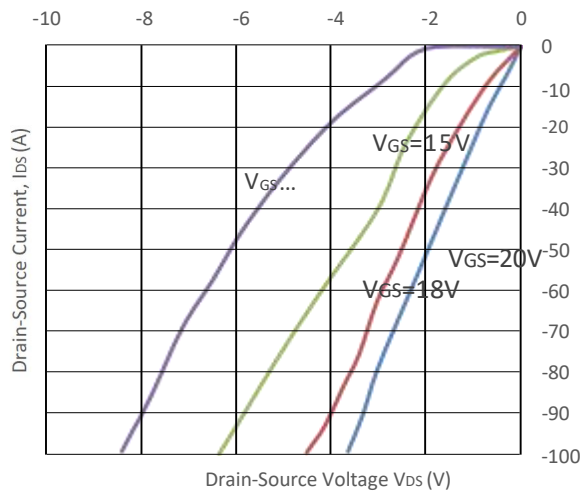
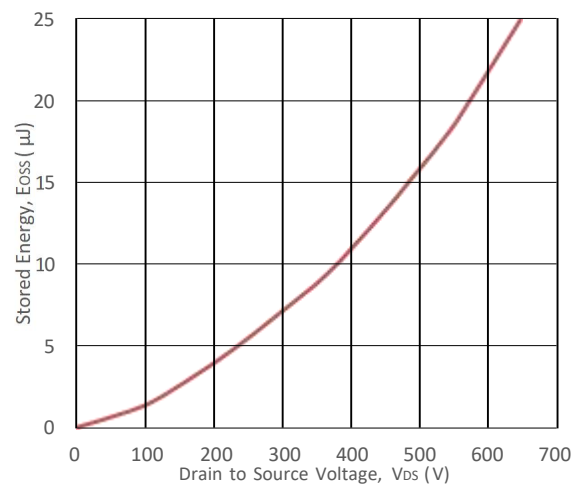
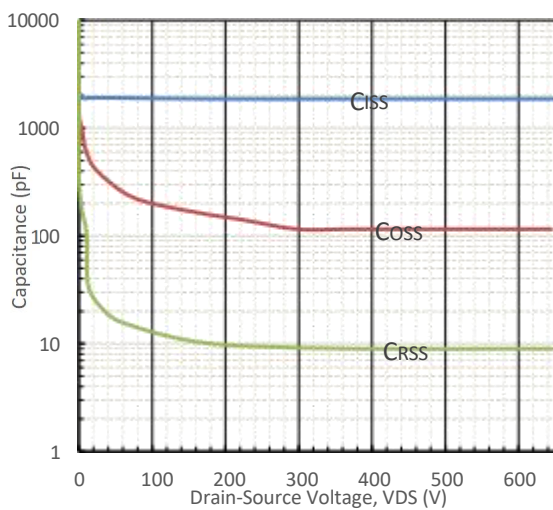
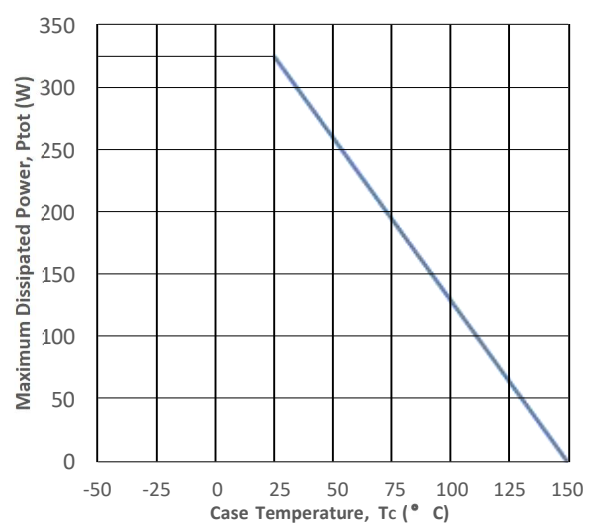
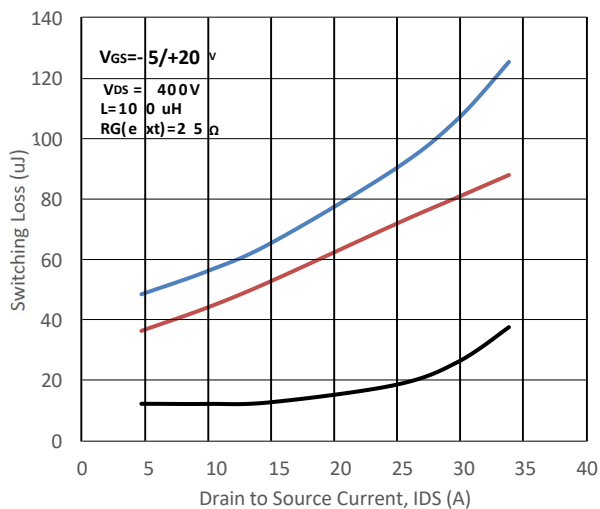
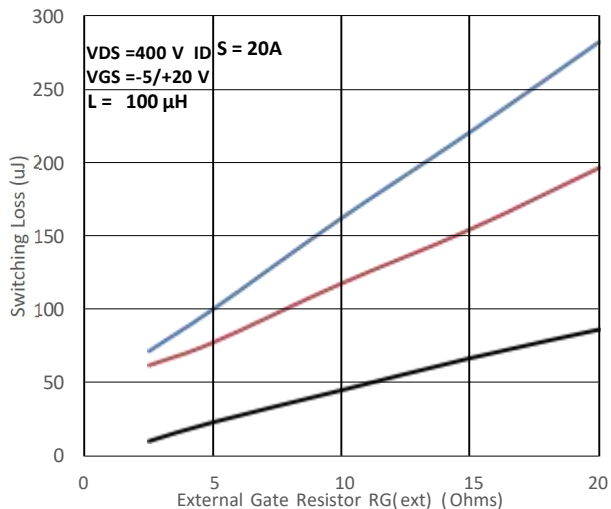
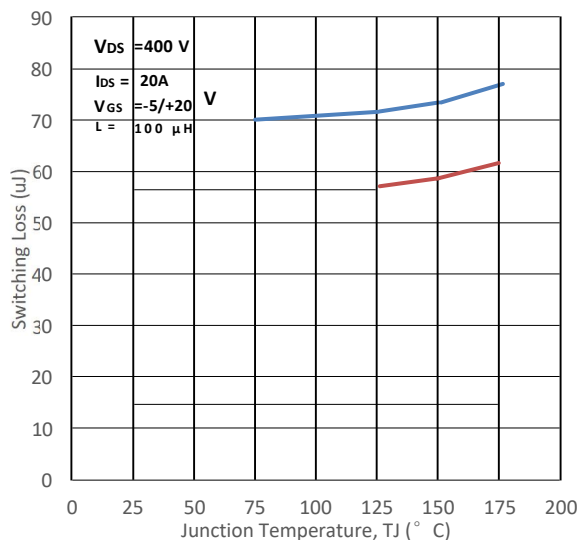
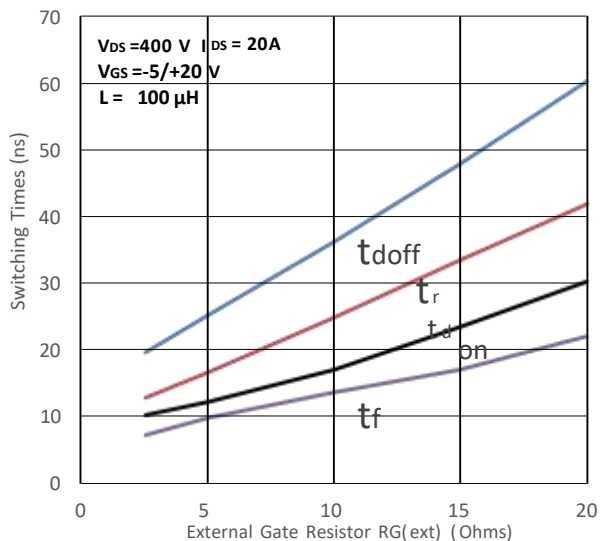
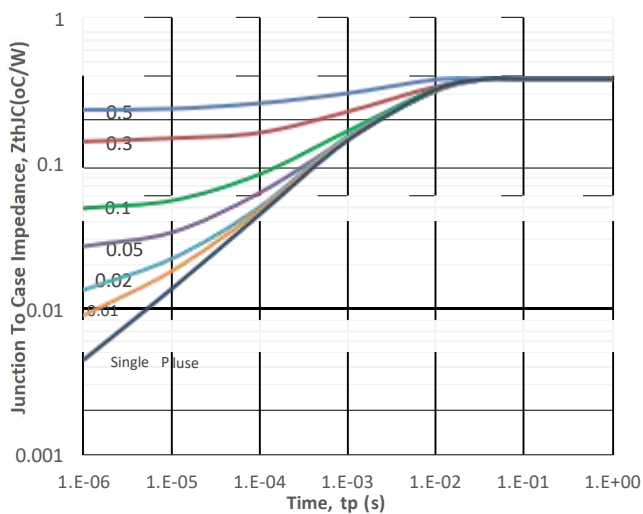
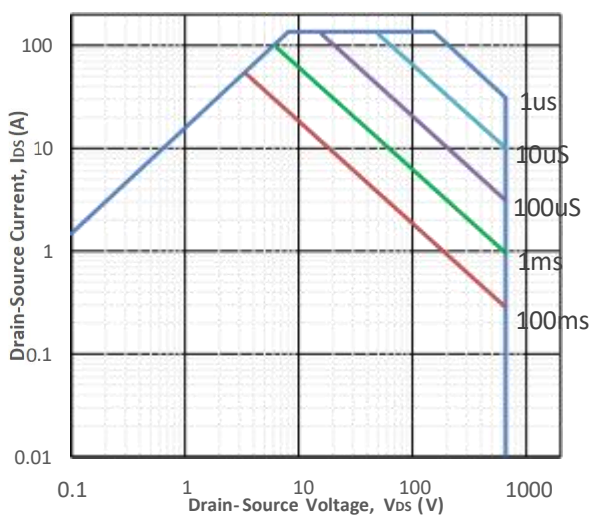
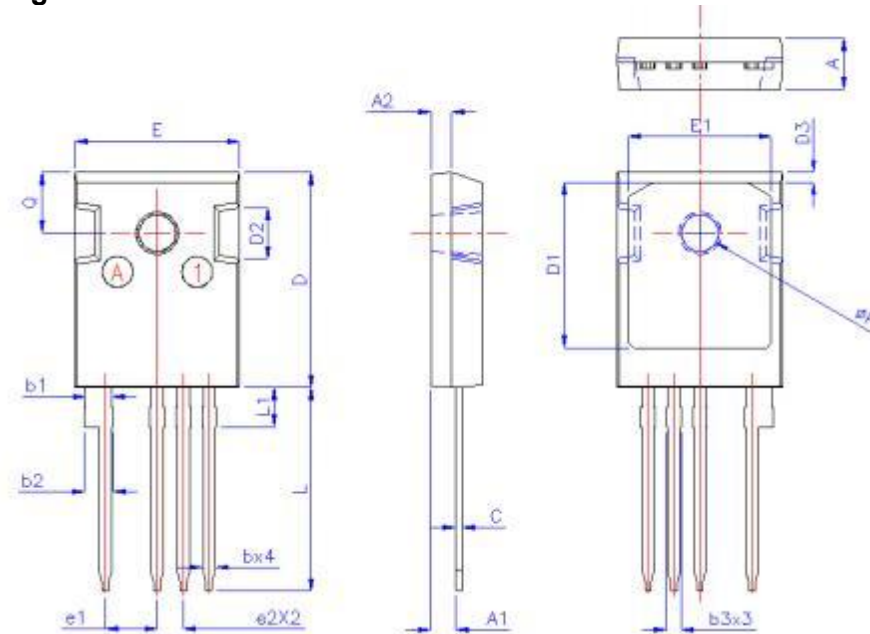
Fig7. Threshold Voltage vs. Temperature

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. RG(ext)

Fig15. Switching Energy vs. Temperature

Fig16. Switching Times vs. RG(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	4.9	5	5.1	0.193	0.197	0.201
A1	2.31	2.42	2.52	0.091	0.095	0.099
A2	1.9	2	2.1	0.075	0.079	0.083
b	1.16	1.22	1.27	0.046	0.048	0.050
b1	1.15	1.2	1.25	0.045	0.047	0.049
b2	2.61	2.76	2.91	0.103	0.109	0.115
b3	1.36	1.42	1.47	0.054	0.056	0.058
C	0.59	0.62	0.66	0.023	0.024	0.026
D	20.9	21	21.1	0.823	0.827	0.831
D1	15.94	16.24	16.54	0.628	0.639	0.651
D2		5		0.197 TYP		
D3	0.8	0.95	1.1	0.031	0.037	0.043
e	5.08 BSC				0.200 BSC	
e1	2.54 BSC				0.100BSC	
E	16.05	16.15	16.25	0.632	0.636	0.640
E1	13.82	14.02	14.26	0.544	0.552	0.561
L	19.75	19.95	20.15	0.778	0.785	0.793
L1	---	---	3.87	---	---	0.152
Q	5.95 BSC			0.234BSC		
ØP	3.45	3.6	3.75	0.136	0.142	0.148