LGE3M20120Q

Silicon Carbide Power MOSFET

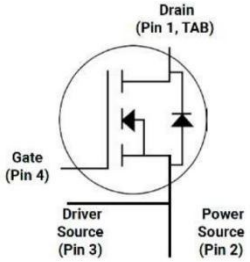
Features

- High Blocking Voltag
- High Frequency Operation
- Low on-resistance
- Fast intrinsic diode with low reverse recovery

V_{DS} = 1200 V
I_D@25ºC = 100A
$R_{DS(ON)}$ = 20mΩ

Benefits

- Higher System Efficiency
- Parallel Device Convenience without thermal runaway
- High Temperature Application
- Hard Switching & Higher Reliability
- Easy to drive



TO-247-4
Pin definition

Applications

- Motor Drives
- Solar / Wind Inverters
- EV Charging Station
- AC/DC converters
- DC/DC converters
- Uninterruptable power supplies

Part Number	Package	Marking
LGE3M20120Q	TO-247-4	LGE3M20120Q

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

Maximum Ratings

T_C=25°C, unless otherwise specified

Parameter	Symbol	Test conditions	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS}=0V, I_D=100μA	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC (f>1 Hz)	-10/+25	V
Gate - Source Voltage (static)	V_{GSop}	static	-5/+20	V

Maximum Ratings

T_C=25°C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous Drain Current: V_{GS} = 20V T_C = 25°C $TC = 100^\circ C$	I_D	100 71	A
Pulsed Drain Current: T_C = 25°C	$I_{D(pulse)}$	200	A
Short Circuit Capability : V_{DD} = 800V V_{GS} = 20V	t_{sc}	TBD	μS
Short Circuit Capability : V_{DD} = 800V V_{GS} = 20V	I_{DS}	TBD	A
Total power dissipation : T_C = 25°C	P_D	428	W
Operating Junction Temperature :	T_j	-55 to 175	°C
Storage Temperature :	T_{stg}	-55 to 175	°C

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

Thermal Characteristics

Parameter	Symbol	Condition	Typ	Max	Unit
Thermal Resistance (per device)	$R_{th(j-c)}$	junction-case	0.27	0.35	°C/W

Electrical Characteristic

T_C =25°C, unless otherwise specified

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1200			V	V_{GS} = 0V I_D = 100μA
Gate Threshold Voltage	$V_{GS(th)}$	1.9	2.8 2.05 1.95	3.8	V	V_{DS} = V_{GS} I_D = 20mA TJ = 150°C TJ = 175°C
Zero Gate Voltage Drain Current	I_{DSS}	0	5	100	μA	V_{DS} = 1200V, V_{GS} = 0V
Gate-Source Leakag Current	I_{GSS}	0 -200	10 -10	200 0	nA	V_{GS} = 20V V_{DS} = 0V V_{GS} = -5V V_{DS} = 0V
Drain-Source On-State Resistance	$R_{DS(on)}$		20 35 39	29	mΩ	V_{GS} = 20V, I_D = 50 A T_J = 150°C T_J = 175°C
Transconductance	gfs		36 30 29.5		S	V_{GS} = 20V, I_D = 50 A T_J = 150°C T_J = 175°C
Input capacitance	C_{iss}		4900		pF	V_{DS} = 1000V V_{GS} = 0V f = 1MHz
Output capacitance	C_{oss}		248			
Reverse transfer capacitance	C_{rss}		14			
Coss Stored Energy	E_{oss}		146		μJ	

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

Total gate charge	Q_g		254		nC	V_{DS} = 800V V_{GS} = -5V / 20V I_D = 50 A
Gate-source charge	Q_{gs}		71			
Gate-drain charge	Q_{gd}		109			
Internal gate input resistance	$R_{g(int)}$		2.0		Ω	f = 1MHz I_D = 0A
Turn-On Switching Energy	E_{ON}		1250		µJ	V_{DS} = 800V , V_{GS} = -5V/20V I_D = 50A $R_{G(ext)}$ =1 Ω L= 450µH
Turn-Off Switching Energy	E_{OFF}		126			
Turn-On Delay Time	$t_{d(on)}$		28		ns	V_{DS} = 800V V_{GS} = -5V/20V I_D = 50A , $R_{G(ext)}$ =1 Ω L = 450µH
Rise Time	t_r		46			
Turn-Off Delay Time	$t_{d(off)}$		56			
Fall Time	t_f		12			
Avalanche Capability	E_{AS}		1.36		mJ	V_{DD} = 100V V_{GS} =20V L=2mH
	I_{Av}		37		A	

Reverse Diode Characteristics

T_C =25°C, unless otherwise specified

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Diode Forward Voltage	V_{SD}		3.8 3.5 3.4		V	V_{GS} = -5V I_{SD} = 25A T_J = 150°C T_J = 175°C
Continuous Diode Forward Current	I_S		85		A	V_{GS} = -5V
Reverse Recovery time	t_{rr}		34		ns	V_{GS} = -5V I_{SD} = 50A V_R = 800V dif/dt = 2100 A/µs
Reverse Recovery Charge	Q_{rr}		450		nC	
Peak Reverse Recovery Current	I_{rrm}		24		A	

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

Typical Performanc

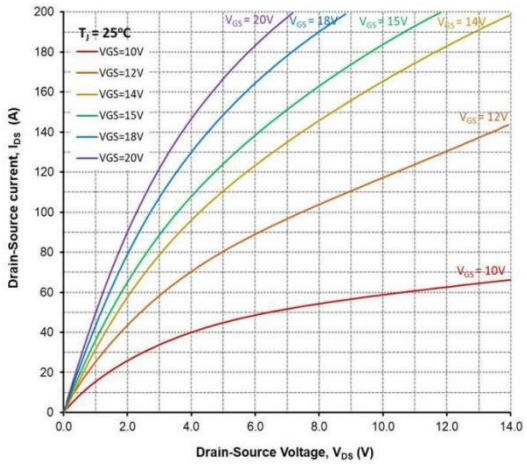


Figure 1. Output Characteristics, TJ = 25°C

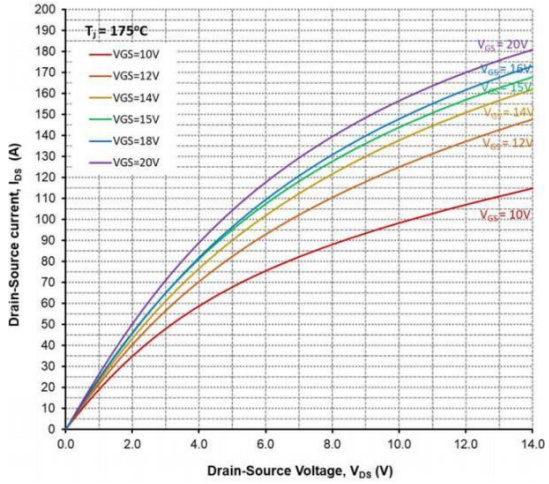


Figure 2. Output Characteristics, TJ = 175°C

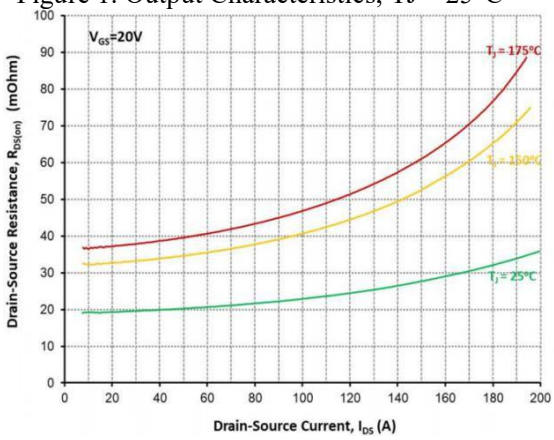


Figure 3. On-Resistance vs. Drain Current For Various Temperatures

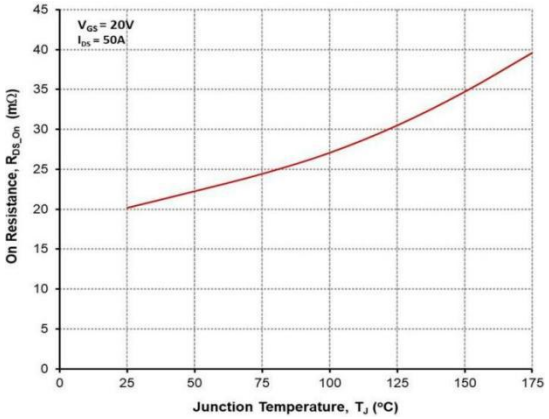


Figure 4. On-Resistance vs. Temperature

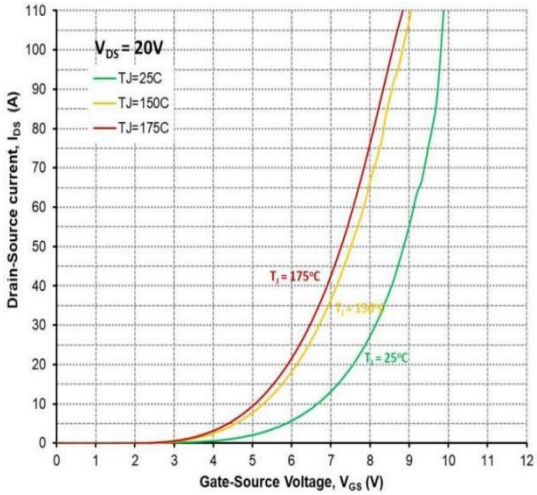


Figure 5. Transfer Characteristic For Various Junction Temperatures

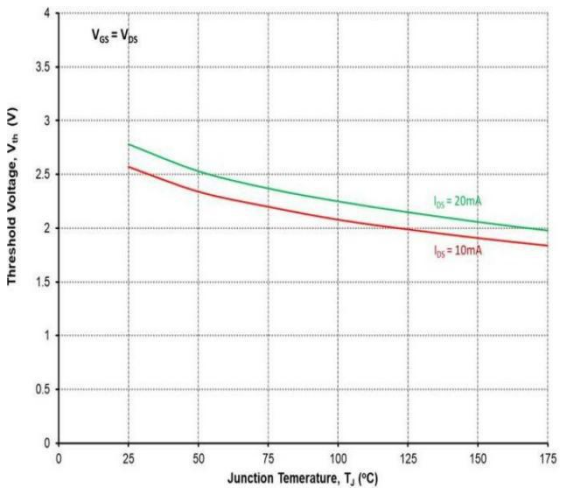


Figure 6. Threshold Voltage vs. Temperature

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

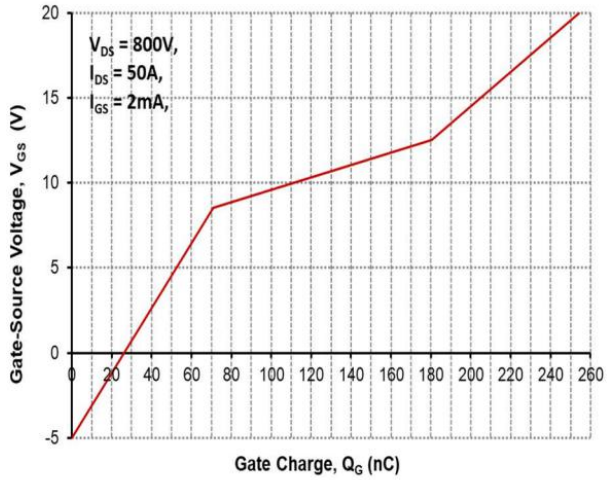


Figure 7. Gate Charge Characteristics

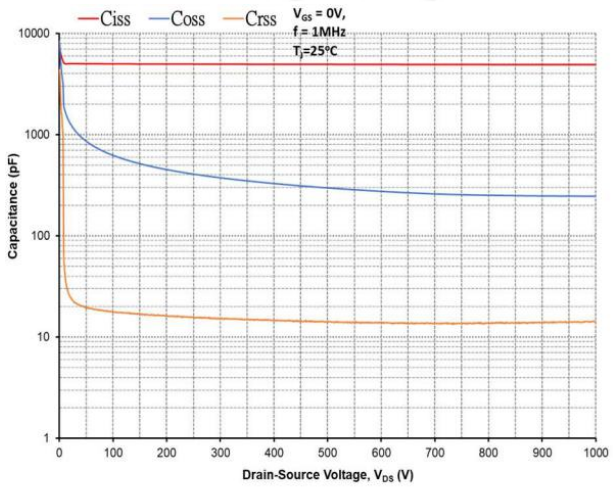


Figure 8. Capacitances vs. Drain-Source Voltage (0-1000V)

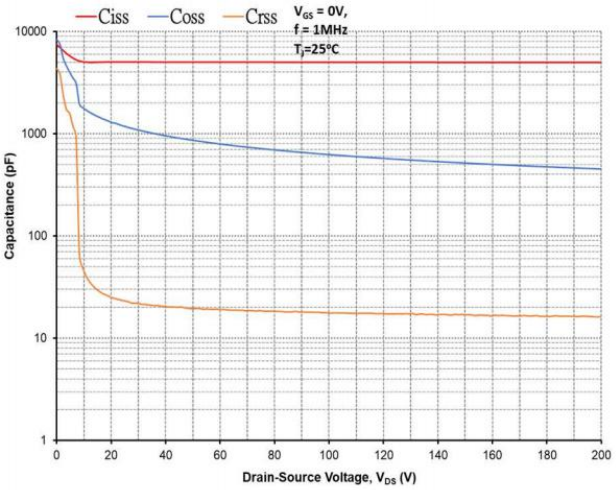


Figure 9. Capacitances vs. Drain-Source Voltage (0-200V)

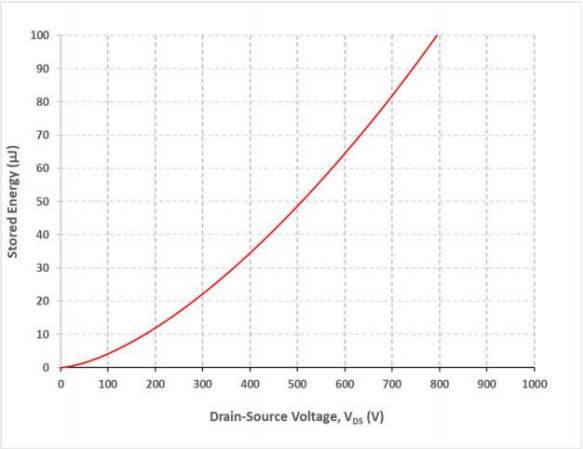


Figure 10. Output Capacitor Stored Energy

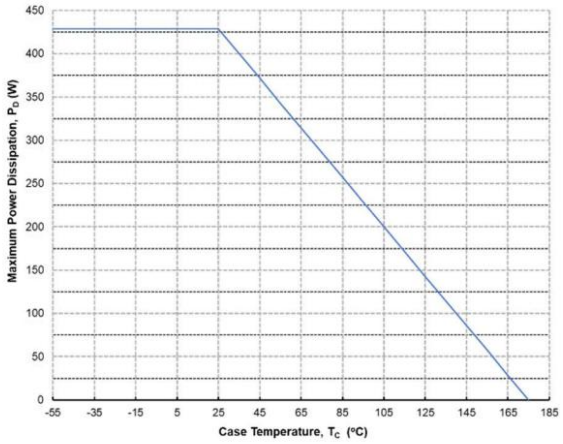


Figure 11. Maximum Power Dissipation Derating vs. Case Temperature

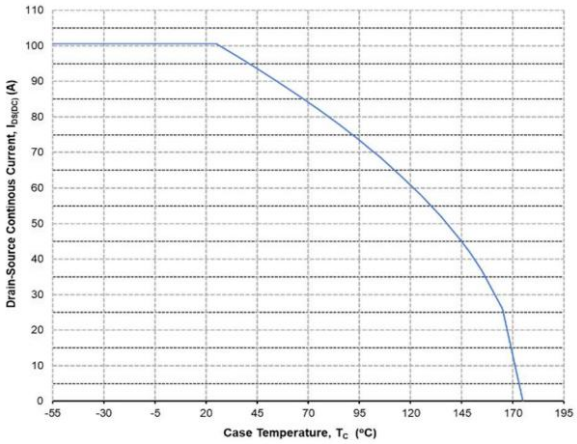


Figure 12. Continuous Drain Current Derating vs. Case Temperature

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

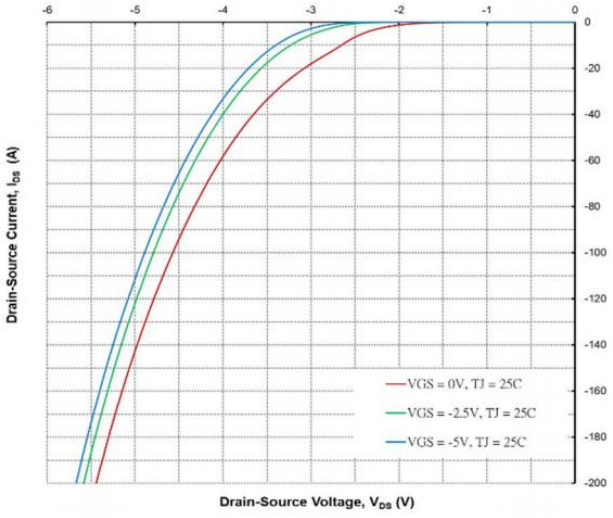


Figure 13. Body Diode Characteristics @ 25°C

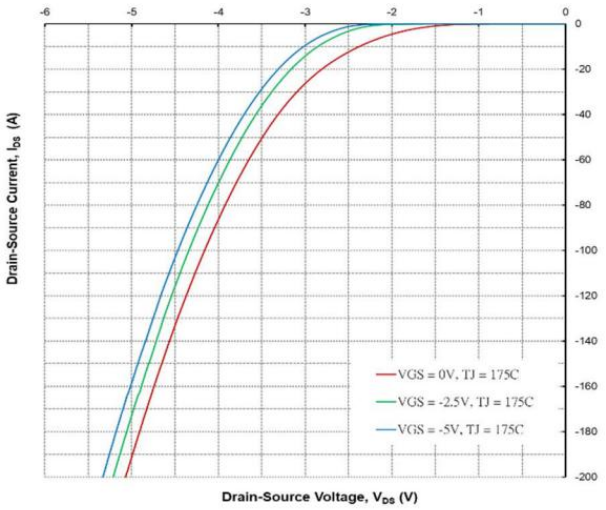


Figure 14. Body Diode Characteristics @ 175°C

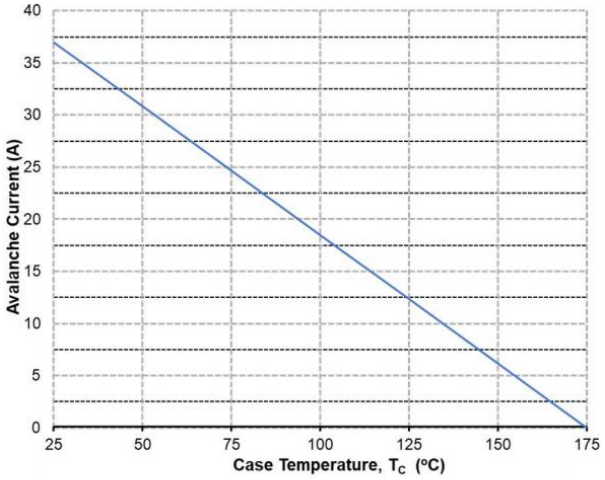


Figure 15. Single Avalanche vs. Temperature

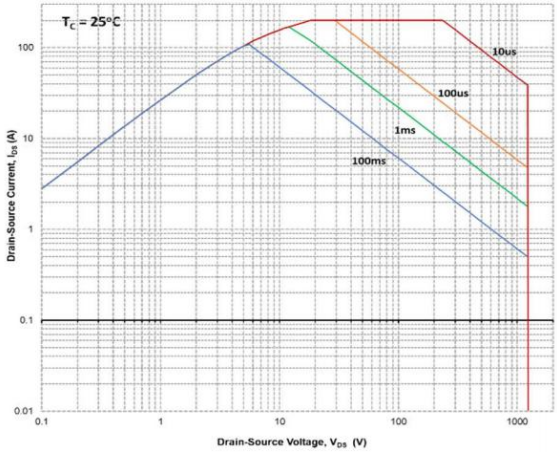
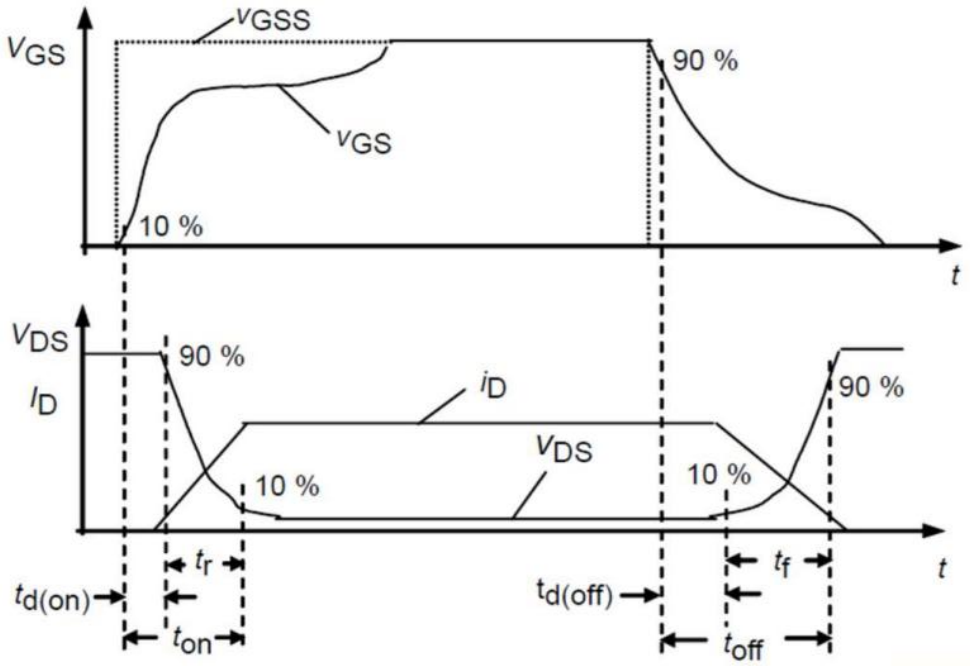
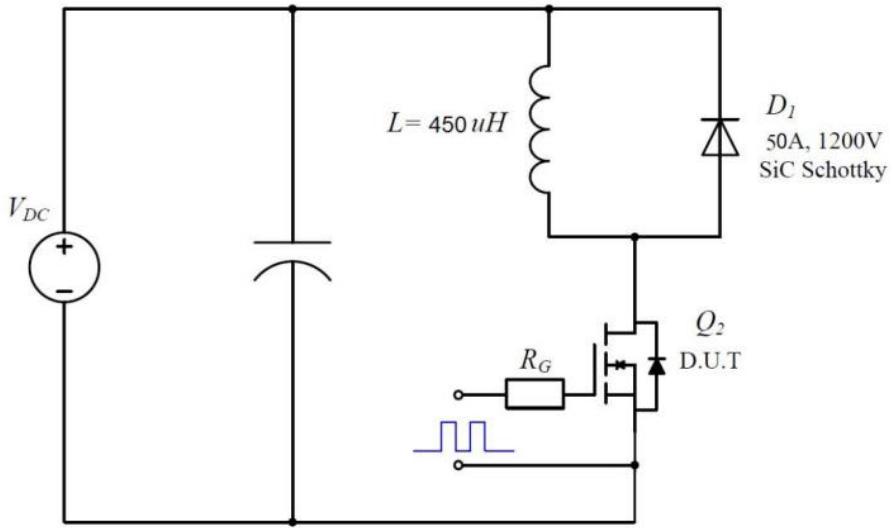


Figure 16. Safe Operating Area

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

Switching Times Definition and Test Circuit





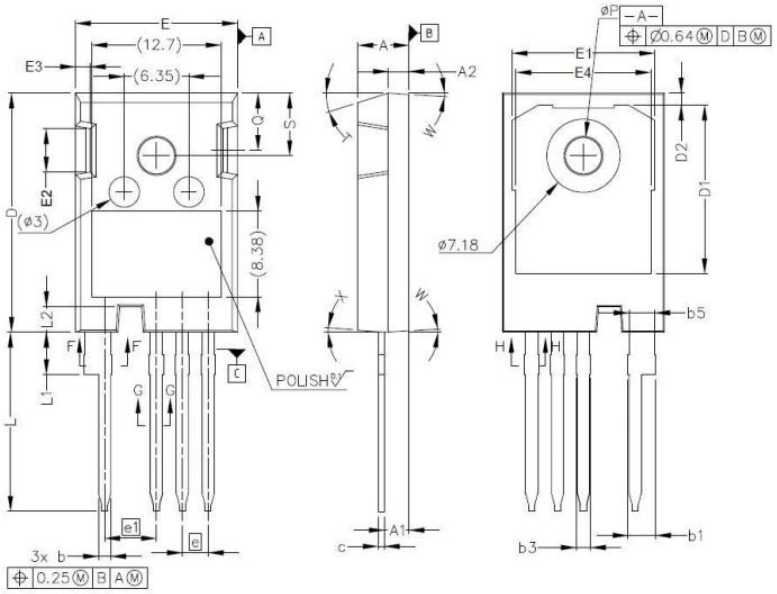
Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

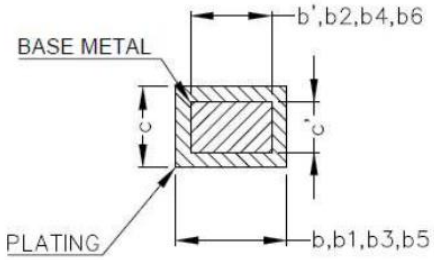
LGE3M20120Q

Silicon Carbide Power MOSFET

Package Dimensions

(TO-247-4 Package)





SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

SYMBOL	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5 ° REF.	
X	4° REF.	

Packge	Packing	Box Size L×W×H(mm)	Quatity(pcs/box)	Carton Size L×W×H(mm)	Quatity(pcs/carton)
TO-247	30pcs/Tube	570×155×50	450	580×340×125	1800

Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.