LGE3M35120Q

Silicon Carbide Power MOSFET

Features

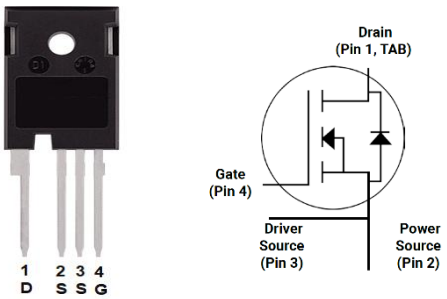
- High Blocking Voltage
- High Frequency Operation
- Low on-resistance
- Fast intrinsic diode with low reverse recovery
- 100% avalanche tested

V_{DS} = 1200 V
I_D@25°C = 69A
$R_{DS(ON)}$ = 33mΩ

Benefits

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

TO-247-4



Applications

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

Part Number	Package	Marking
LGE3M35120Q	TO-247-4	LGE3M35120Q

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
Continuous Drain Current	I_D	V_{GS} = 20V, T_C=25°C V_{GS} = 20V, T_C=100°C	69 49	A
Pulsed Drain Current	$I_{D(pulse)}$	T_C=25°C	114	A
Total power dissipation	P_D	T_C=25°C	300	W
Avalanche Capability	E_{AS}	V_{DD} = 100V, V_{GS}=20V, L=2mH	576	mJ
Avalanche Capability	I_{AV}	V_{DD} = 100V, V_{GS}=20V, L=2mH	24	A
Operating Junction Temperature	T_J		-55 to 175	°C
Storage Temperature	T_{STG}		-55 to 175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

Electrical Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 100μA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 10mA	1.8	2.6	3.7	V
		V_{DS} = V_{GS}, I_D = 10mA, T_J = 150°C		1.9		
		V_{DS} = V_{GS}, I_D = 10mA, T_J = 175°C		1.8		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V	0	1	50	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20V, V_{DS} = 0V	0	1	200	nA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = -5V, V_{DS} = 0V	-200	-1	0	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20V, I_D = 40 A		33	45	mΩ
		V_{GS} = 20V, I_D = 40 A, T_J = 150°C		50		
		V_{GS} = 20V, I_D = 40 A, T_J = 175°C		56		
		V_{GS} = 18V, I_D = 40 A,		37		
Transconductance	g_{fs}	V_{DS} = 20V, I_D = 40 A,		24		S
		V_{DS} = 20V, I_D = 40 A, T_J = 150°C		22		
		V_{DS} = 20V, I_D = 40 A, T_J = 175°C		22		
Input capacitance	C_{iss}	V_{DS} = 1000V, V_{GS} = 0V f = 1MHz		2660		pF
Output capacitance	C_{oss}			128		
Reverse transfer capacitance	C_{rss}			9		
C_{oss} Stored Energy	E_{oss}			84		μJ
Total gate charge	Q_g	V_{DS} = 800V, V_{GS} = -5V / 20V I_D = 40 A,		135		nC
Gate-source charge	Q_{gs}			36		
Gate-drain charge	Q_{gd}			53		
Internal gate input resistance	$R_{g(int)}$	f = 1MHz, I_D = 0A		2.4		Ω
Turn-On Switching Energy	E_{ON}	V_{DS} = 800 V, V_{GS} = -5V/20V, I_D = 40A, $R_{G(ext)}$ =2Ω, L=100μH		532		μJ
Turn-Off Switching Energy	E_{OFF}			24		
Turn-On Delay Time	$t_{d(on)}$			32		ns
Rise Time	t_r			18		
Turn-Off Delay Time	$t_{d(off)}$			41		
Fall Time	t_f			9		

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

Reverse Diode Characteristics (T_C=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_{SD}	V_{GS} = -5V, I_{SD} = 20A,		4.6		V
		V_{GS} = -5V, I_{SD} = 20A, T_J = 150°C		4.1		
		V_{GS} = -5V, I_{SD} = 20A, T_J = 175°C		4.0		
Continuous Diode Forward Current	I_S	V_{GS} = -5V			55	A
Reverse Recovery time	t_{rr}	V_{GS} = -5V, I_{SD} = 40A, V_R= 800V, dif/dt = 3400 A/μs		19		ns
Reverse Recovery Charge	Q_{rr}			330		nC
Peak Reverse Recovery Current	I_{rrm}			31		A

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal Resistance (per device)	$R_{th(j-c)}$	junction-case		0.4	0.5	^{0}C/W

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

Typical Performance

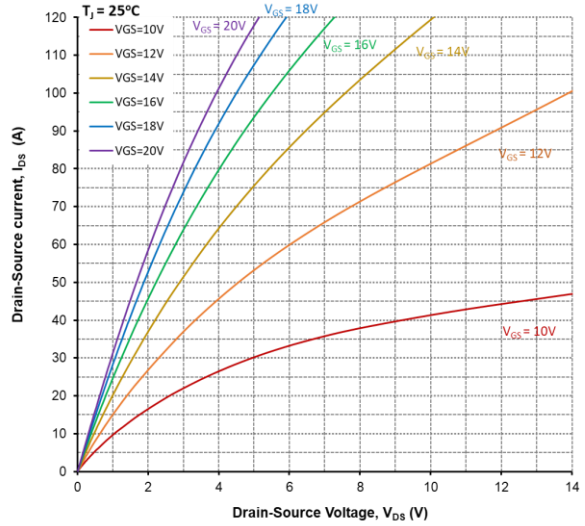


Figure 1. Output Characteristics, T_J = 25°C

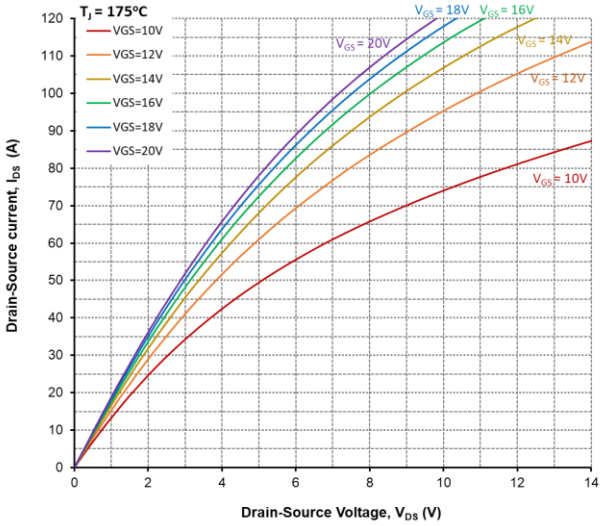


Figure 2. Output Characteristics, T_J = 175°C

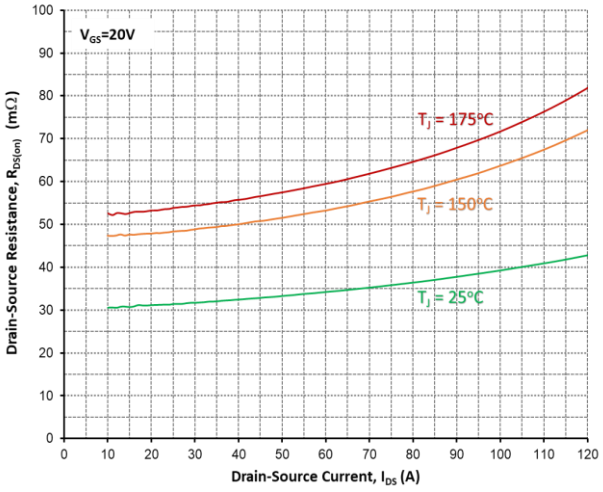


Figure 3. On-Resistance vs. Drain Current For Various Temperatures

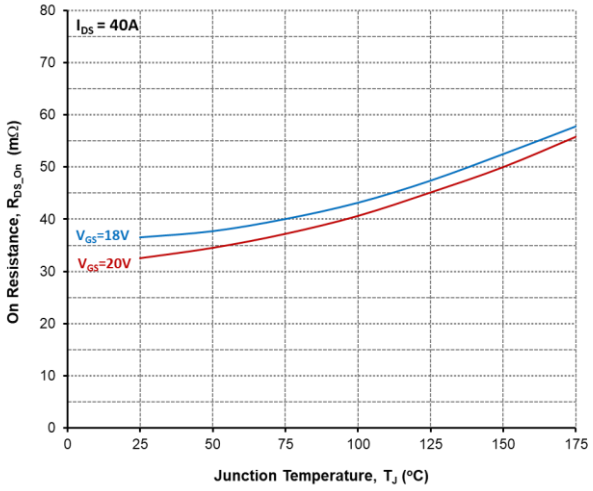


Figure 4. On-Resistance vs. Temperature

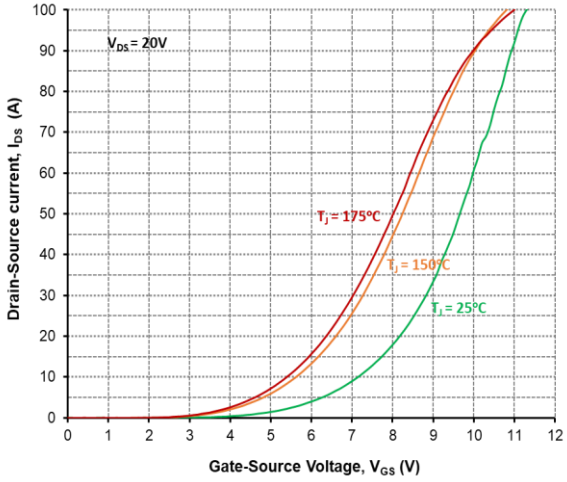


Figure 5. Transfer Characteristic For Various Junction Temperatures

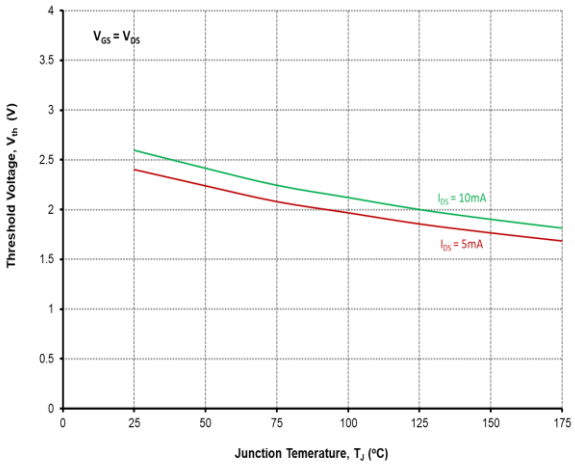


Figure 6. Threshold Voltage vs. Temperature

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

Typical Performance

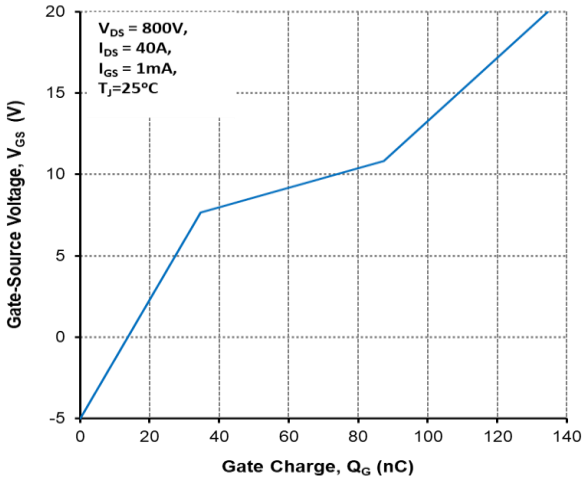


Figure 7. Gate Charge Characteristics

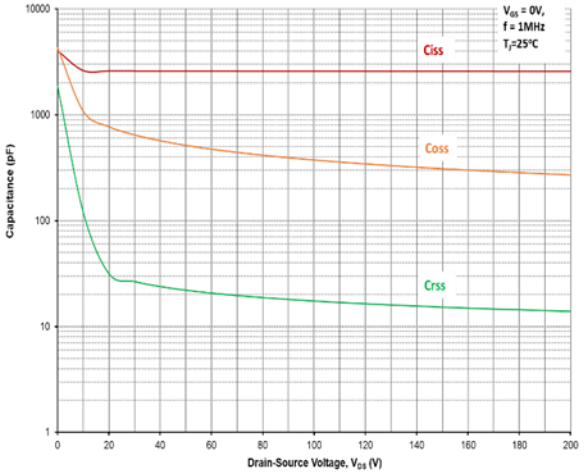


Figure 8. Capacitances vs. Drain-Source Voltage (0-200V)

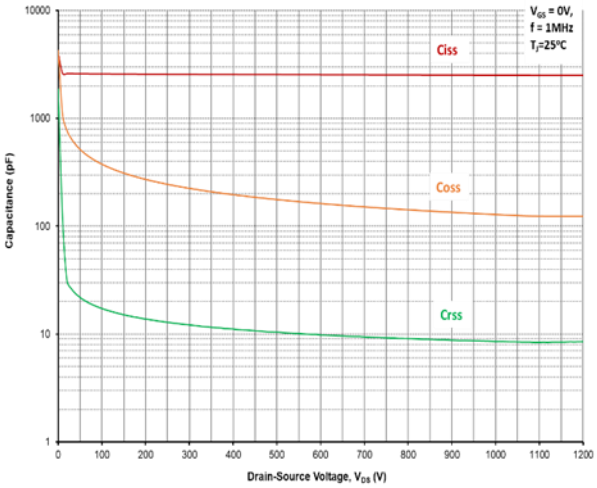


Figure 9. Capacitances vs. Drain-Source Voltage (0-1200V)

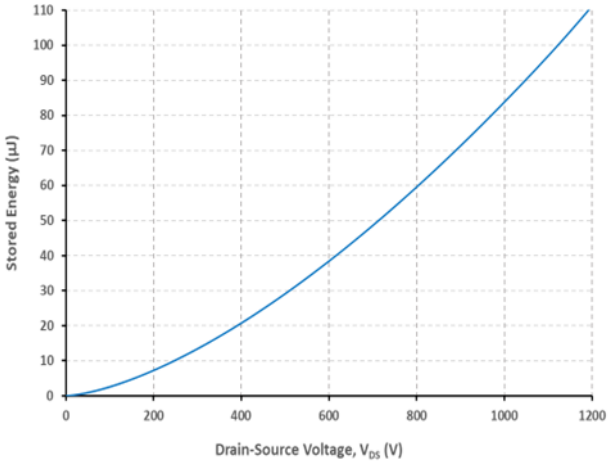


Figure 10. Output Capacitor Stored Energy

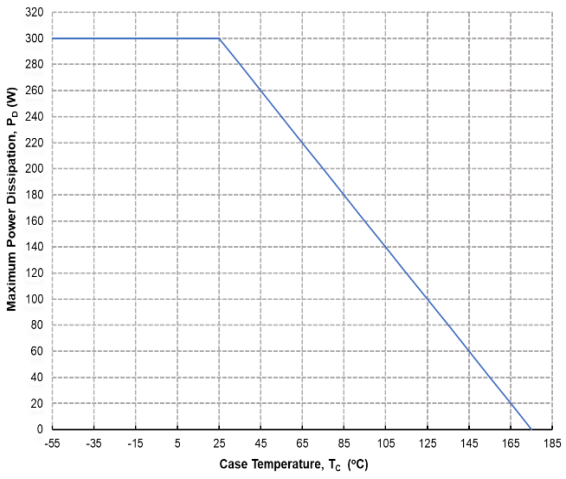


Figure 11. Maximum Power Dissipation Derating vs. Case Temperature

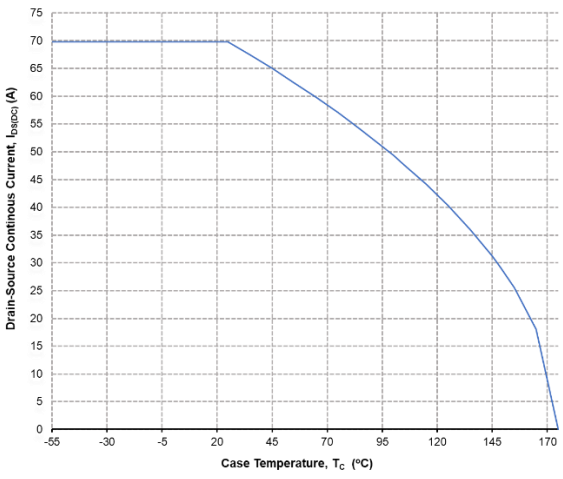


Figure 12. Continuous Drain Current Derating vs. Case Temperature

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

Typical Performance

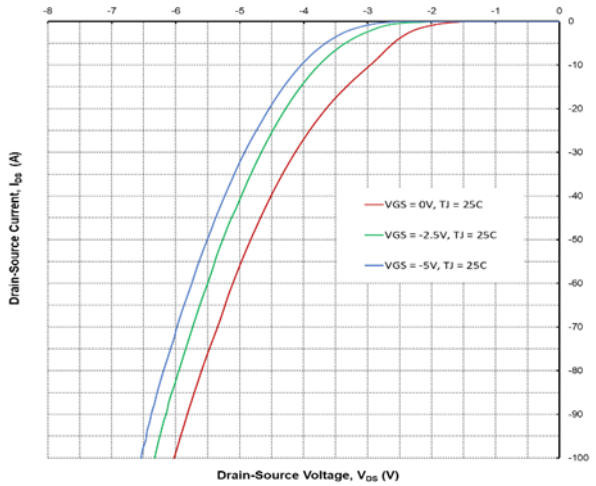


Figure 13. Body Diode Characteristics @ 25ºC

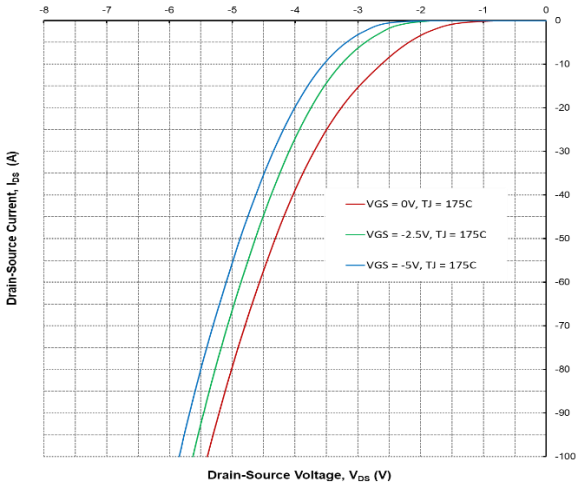


Figure 14. Body Diode Characteristics @ 175ºC

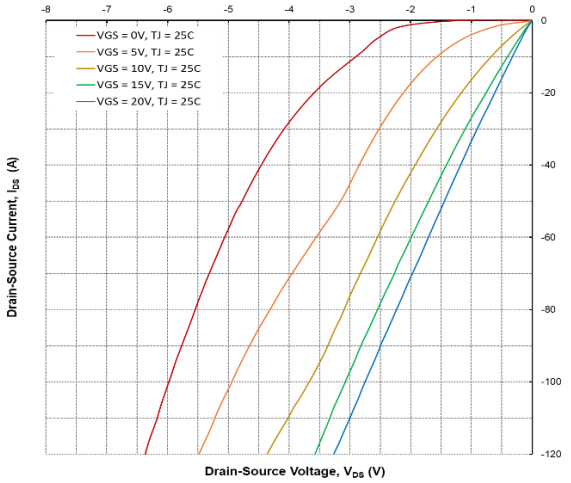


Figure 15. 3rd Quadrant Characteristics @ 25ºC

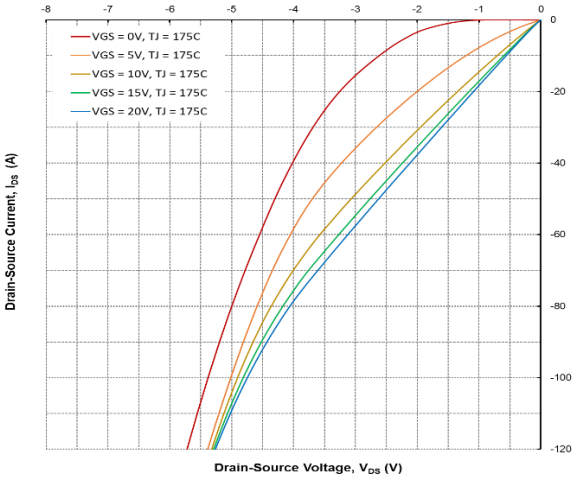


Figure 16. 3rd Quadrant Characteristics @ 175ºC

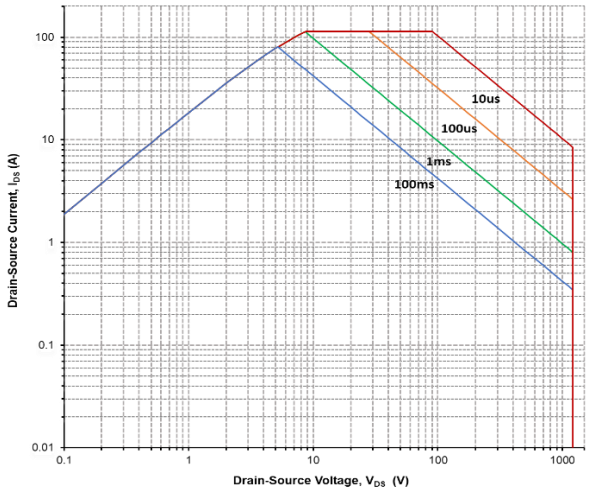


Figure 17. Safe Operating Area

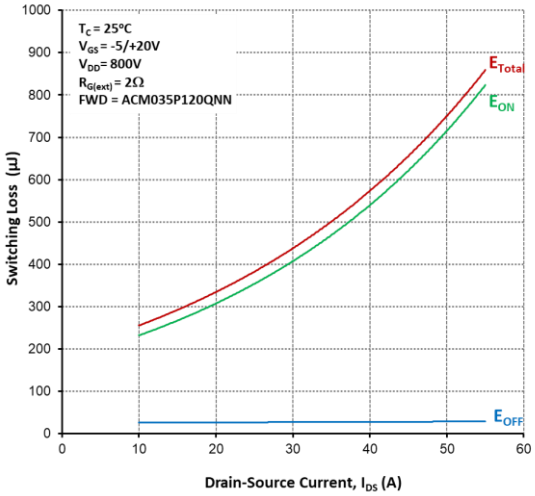


Figure 18. Switching energy vs Drain current

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

Typical Performance

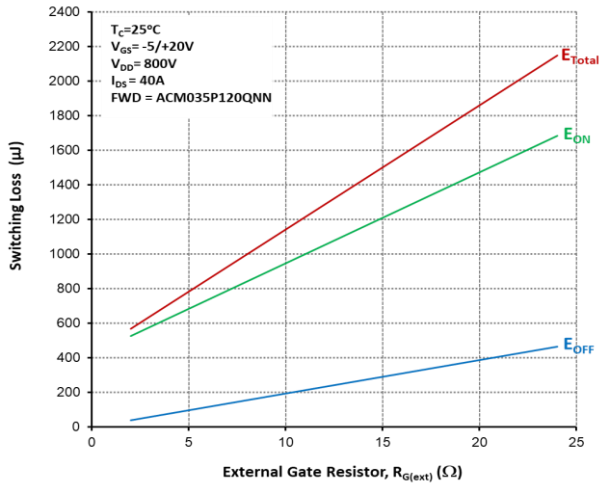


Figure 19. Switching energy vs External Gate Resistor

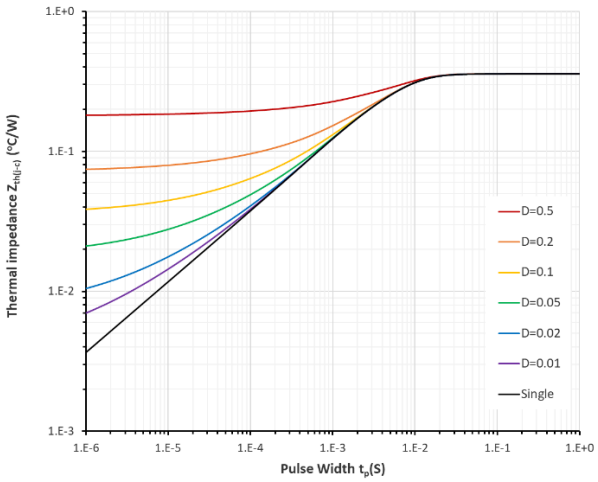


Figure 20. Transient Thermal Impedance (Junction to Case)

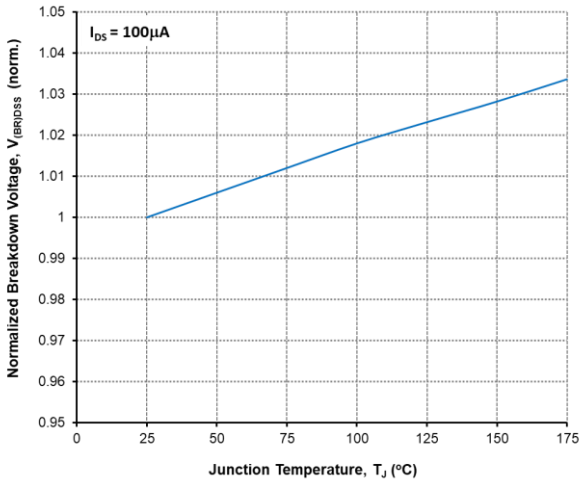
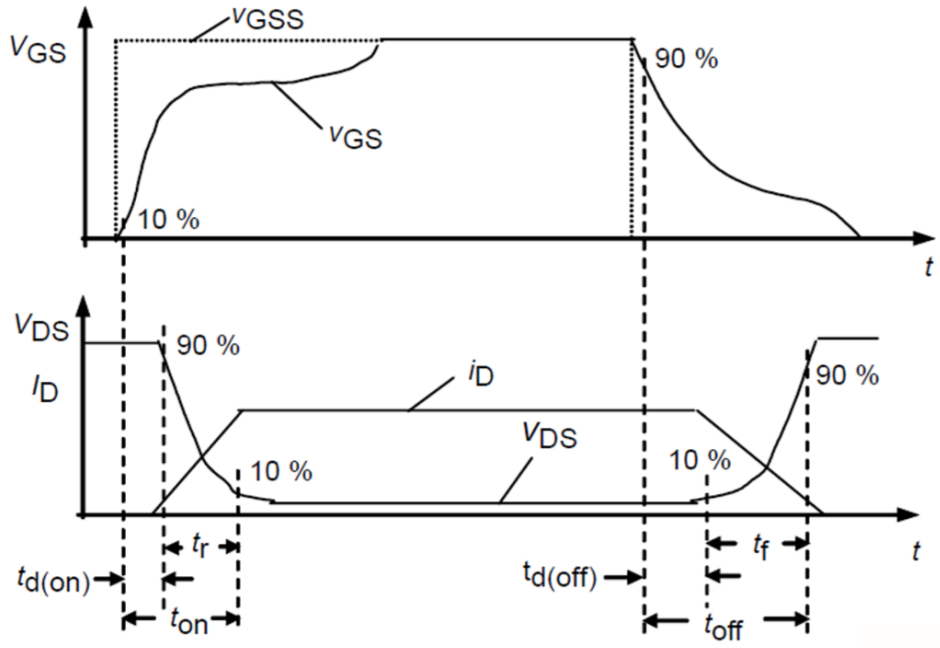
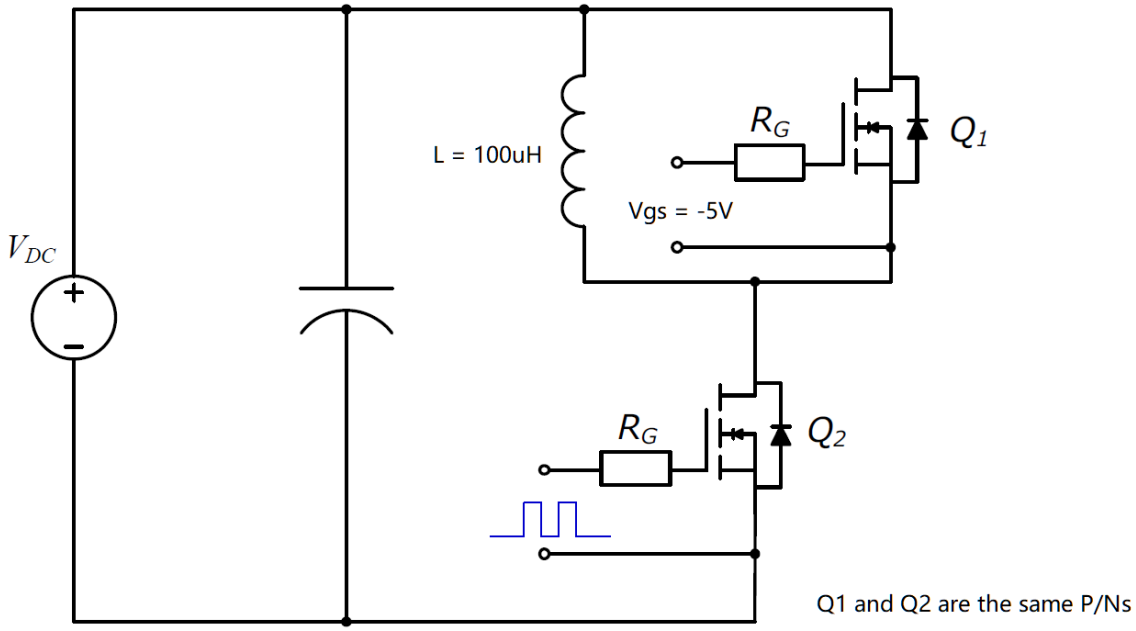


Figure 21. Normalized breakdown voltage vs Temperature

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

Switching Times Definition and Test Circuit

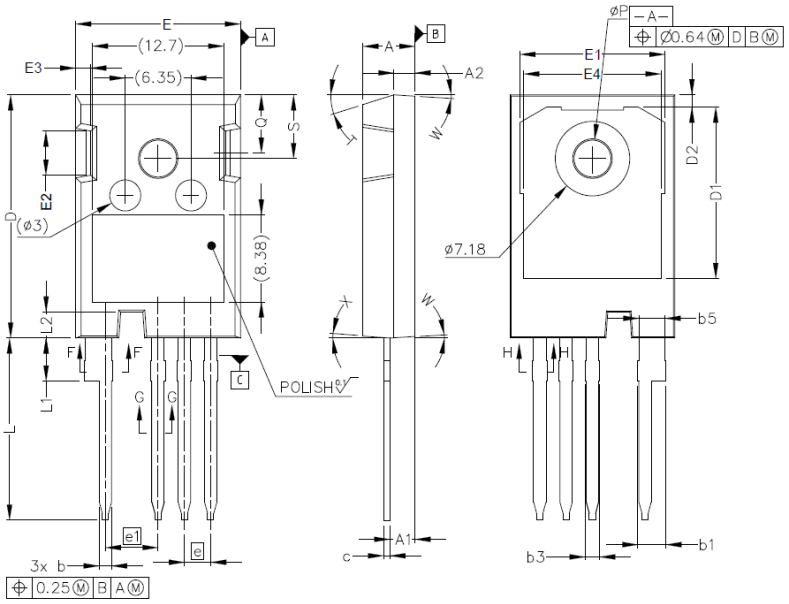


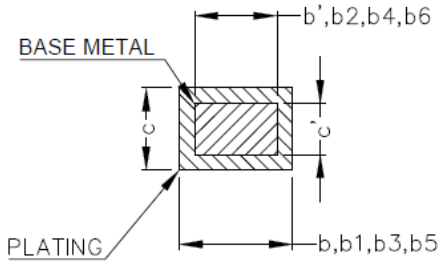


Caution: This device is sensitive to electrostatic discharge .Users should follow ESD handing procedures.

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.	

NOTE ;
1. ALL METAL SURFACES: TIN PLATED,EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.

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.