

Features

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

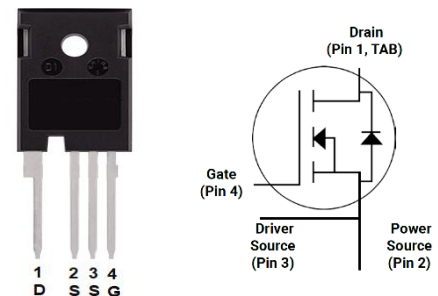
$V_{DS} = 1200\text{ V}$
 $I_D@25^\circ\text{C} = 39\text{ A}$
 $R_{DS(ON)} = 68\text{ m}\Omega$
 AEC-Q101 and PPAP capable

Benefits

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

Applications

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



TO-247-4
Pin definition

Part Number	Package	Marking
LGE3M70120Q	TO-247-4	LGE3M70120Q

Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DSmax}	Drain - Source Voltage		1200	V
V_{GSmax}	Gate - Source Voltage (dynamic), $T_{surge} < 100\text{ ns}$		-10 / +25	V
V_{GSop}	Gate - Source Voltage (static)		-5 / +20	V
I_D	Continuous Drain Current	$V_{GS} = 20\text{ V}, T_C=25^\circ\text{C}$ $V_{GS} = 20\text{ V}, T_C=100^\circ\text{C}$	39 27	A
$I_{D(pulse)}$	Pulsed Drain Current at $T_C=25^\circ\text{C}$		85	A
E_{AS}	Avalanche Energy	$V_{DD} = 100\text{ V}, V_{GS}=20\text{ V}, L=2\text{ mH}$	256	mJ
I_{AV}	Avalanche Peak Current		16	A
P_D	Total power dissipation	$T_C=25^\circ\text{C}$	200	W
T_J	Operating Junction Temperature		-40 to 175	$^\circ\text{C}$
T_{STG}	Storage Temperature		-40 to 175	$^\circ\text{C}$

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	V _{(BR)DSS}	V _{GS} = 0V, I _D = 100μA	1200			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 5mA	1.8	2.6	3.6	V
		V _{DS} = V _{GS} , I _D = 5mA, T _J = 150°C		1.9		
		V _{DS} = V _{GS} , I _D = 5mA, 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 = 20 A		68	85	mΩ
		V _{GS} = 20V, I _D = 20 A, T _J = 150°C		108		
		V _{GS} = 20V, I _D = 20 A, T _J = 175°C		122		
Transconductance	g _{fs}	V _{DS} = 20V, I _D = 20 A,		10.3		S
		V _{DS} = 20V, I _D = 20 A, T _J = 150°C		9.7		
		V _{DS} = 20V, I _D = 20 A, T _J = 175°C		9.6		
Input capacitance	C _{iss}	V _{DS} = 1000V, V _{GS} = 0V f = 1MHz		1340		pF
Output capacitance	C _{oss}			63		
Reverse transfer capacitance	C _{rss}			4		
C _{oss} Stored Energy	E _{oss}			41		
Total gate charge	Q _g	V _{DS} = 800V, V _{GS} = -5V / 20V I _D = 20 A,		69		nC
Gate-source charge	Q _{gs}			20		
Gate-drain charge	Q _{gd}			24		
Internal gate input resistance	R _{g(int)}	f = 1MHz, I _D = 0A		2.5		Ω
Series Inductance	L _S	f = 1MHz		4.5		nH
Turn-On Switching Energy	E _{ON}	V _{DS} = 800 V, V _{GS} = -5V/20V, I _D = 20A, R _{G(ext)} = 2Ω, L = 100μH		210		μJ
Turn-Off Switching Energy	E _{OFF}			33		
Turn-On Delay Time	t _{d(on)}			10		ns
Rise Time	t _r			12		
Turn-Off Delay Time	t _{d(off)}			21		
Fall Time	t _f			9		

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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} = 10A,		4.4		V
		V _{GS} = -5V, I _{SD} = 10A, T _J = 150°C		4.0		
		V _{GS} = -5V, I _{SD} = 10A, T _J = 175°C		3.9		
Continuous Diode Forward Current	I _S	V _{GS} = -5V			33	A
Reverse Recovery time	t _{rr}	V _{GS} = -5V, I _{SD} = 20A, V _R = 800V, dif/dt = 3300 A/μs		14		ns
Reverse Recovery Charge	Q _{rr}			146		nC
Peak Reverse Recovery Current	I _{rrm}			20		A

Thermal Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
R _{th(j-c)}	Thermal resistance from junction to case		0.6	0.75	°C/W

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Typical Performance

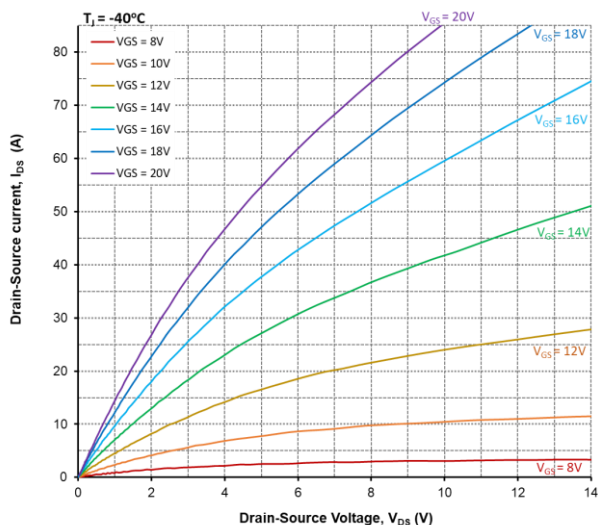


Figure 1. Output Characteristics, $T_J = -40^\circ\text{C}$

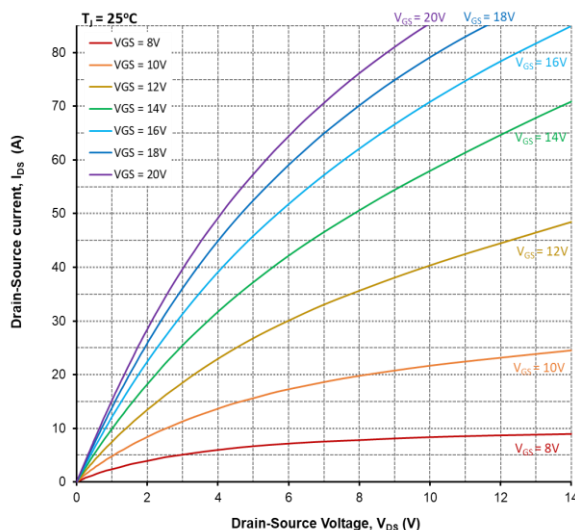


Figure 2. Output Characteristics, $T_J = 25^\circ\text{C}$

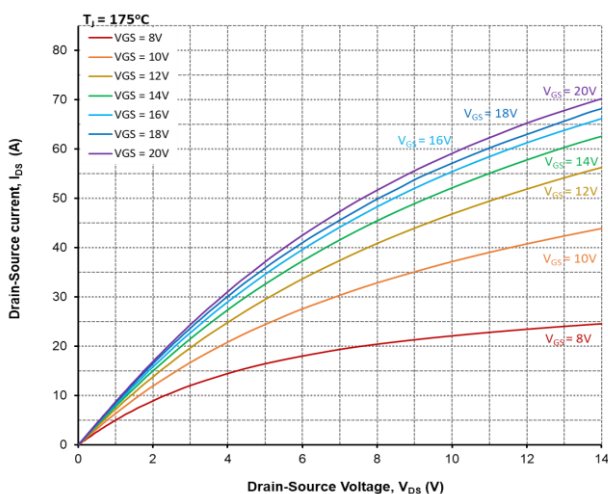


Figure 3. Output Characteristics, $T_J = 175^\circ\text{C}$

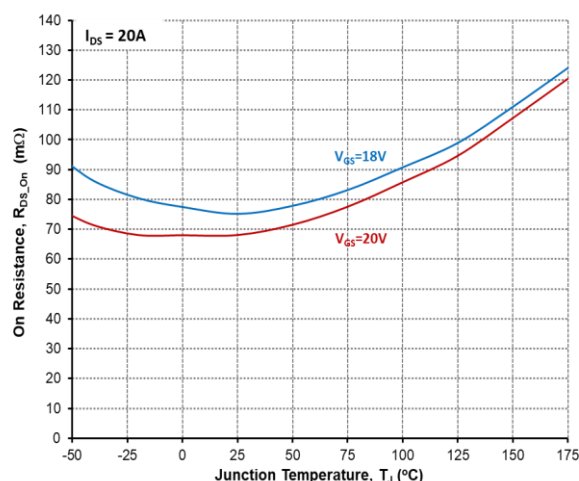


Figure 4. On-Resistance vs. Temperature

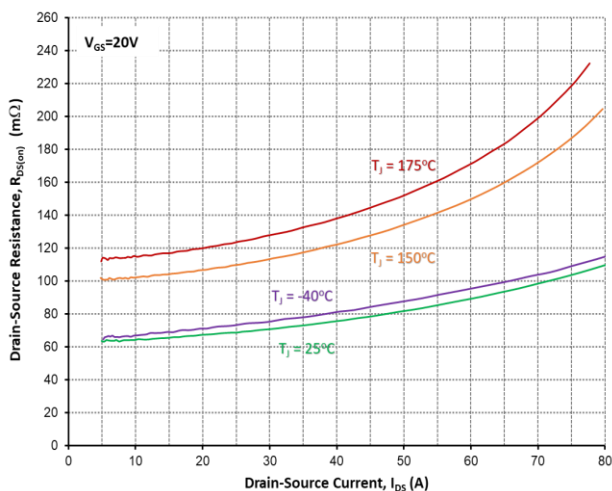


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

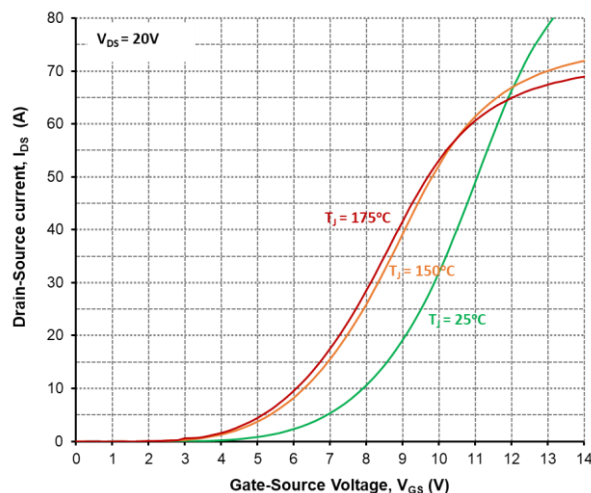


Figure 6. Transfer Characteristic For Various Junction Temperatures

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Typical Performance

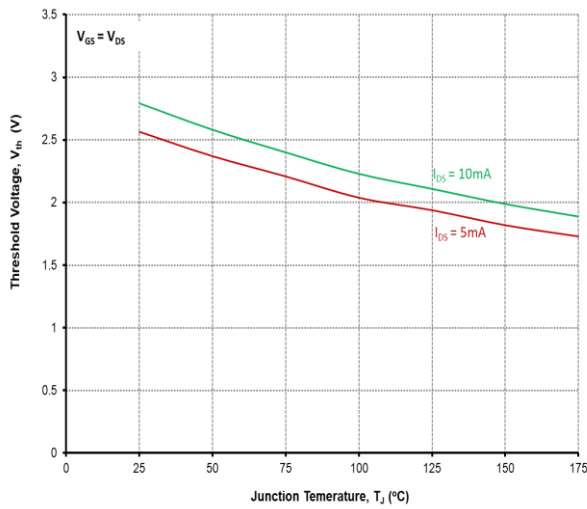


Figure 7. Threshold Voltage vs. Temperature

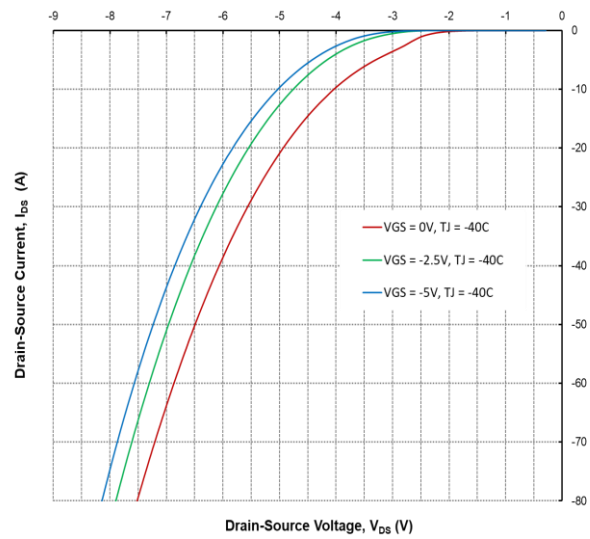


Figure 8. Body Diode Characteristics @ -40°C

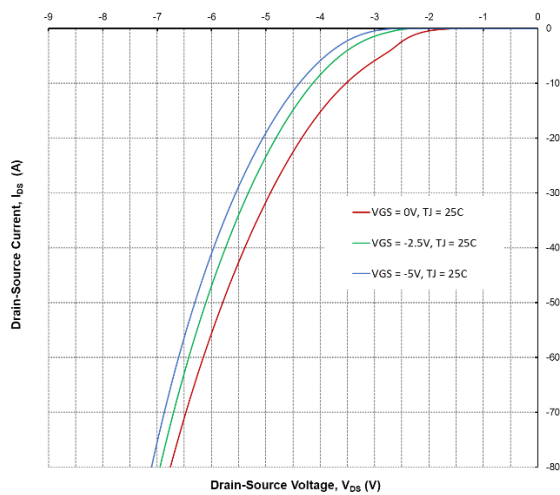


Figure 9. Body Diode Characteristics @ 25°C

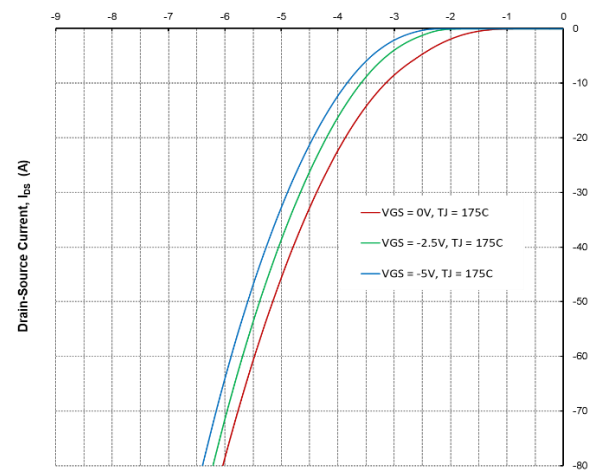


Figure 10. Body Diode Characteristics @ 175°C

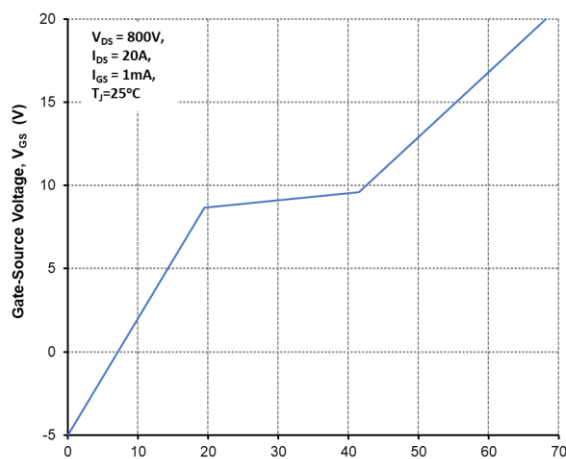


Figure 11. Gate Charge Characteristics

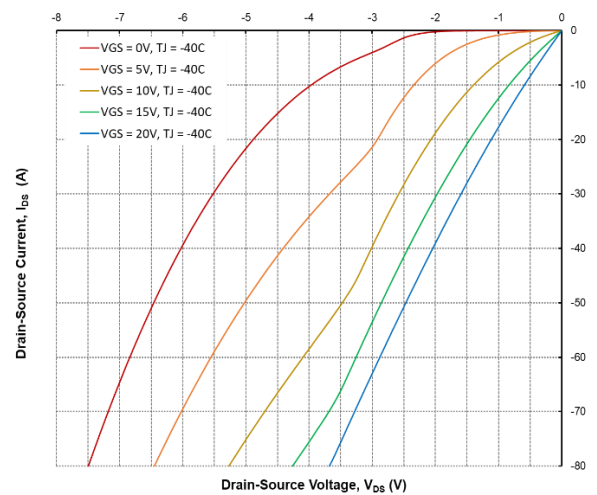


Figure 12. 3rd Quadrant Characteristics @ -40°C

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

Typical Performance

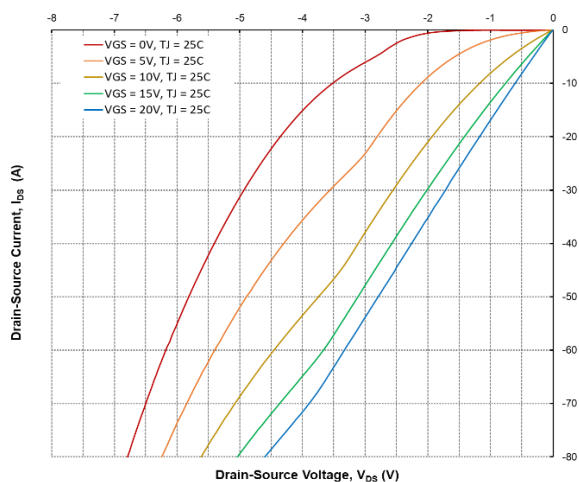


Figure 13. 3rd Quadrant Characteristics @ 25°C

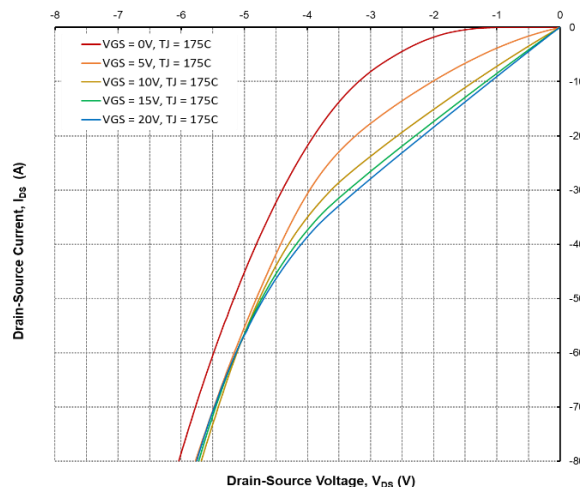


Figure 14. 3rd Quadrant Characteristics @ 175°C

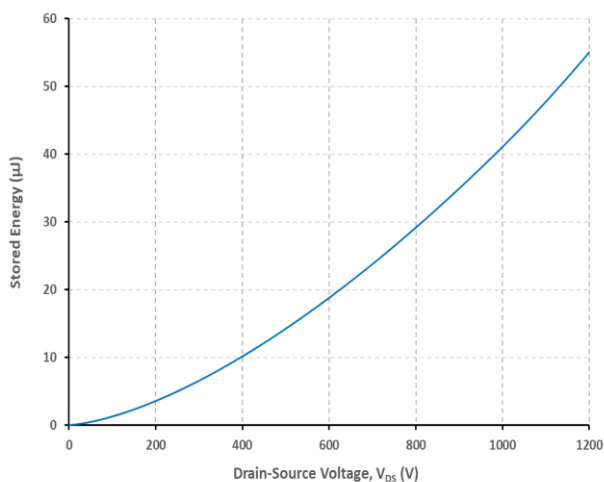


Figure 15. Output Capacitor Stored Energy

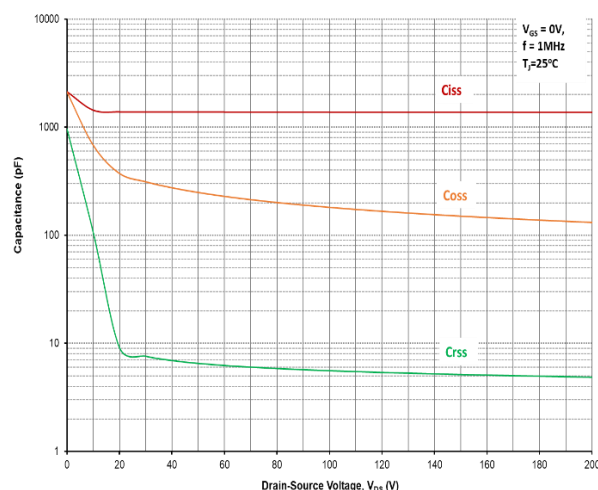


Figure 16. Capacitances vs. Drain-Source Voltage (0-200V)

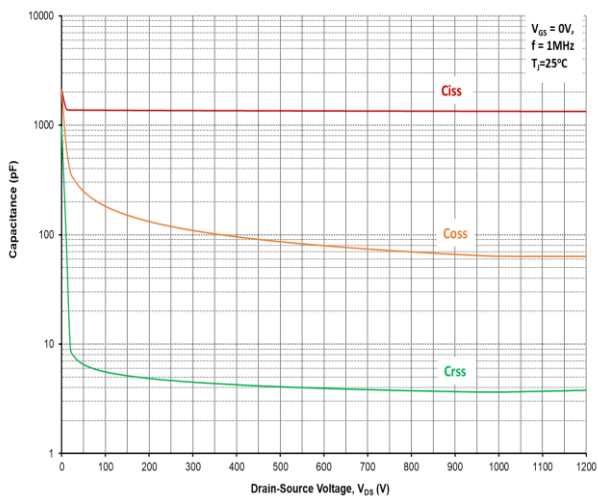


Figure 17. Capacitances vs. Drain-Source Voltage (0-1200V)

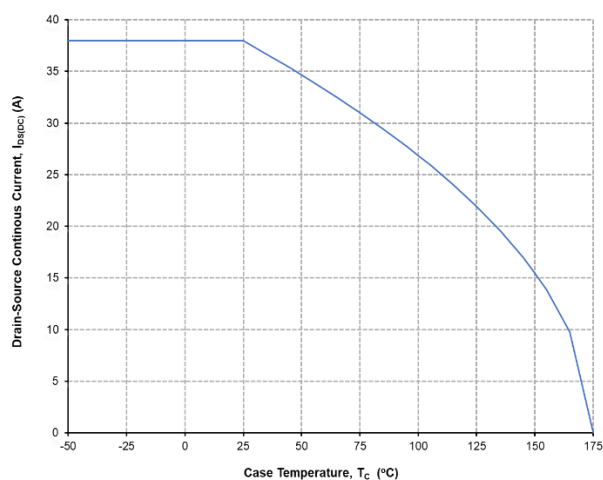


Figure 18. Continuous Drain Current Derating vs. Case Temperature

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

Typical Performance

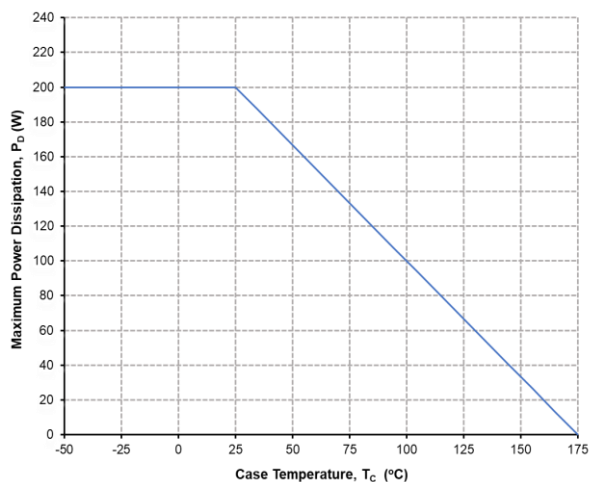


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

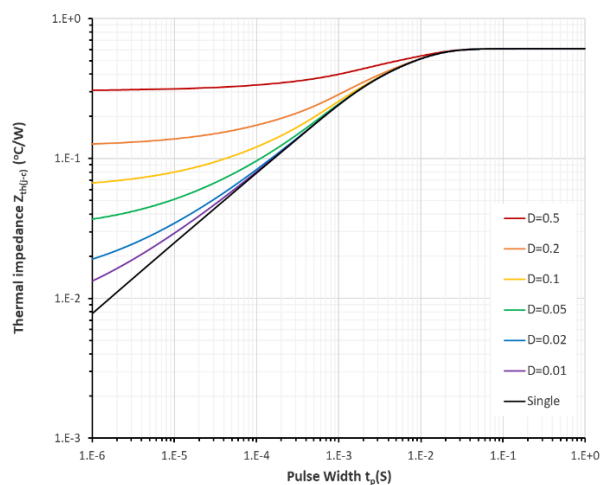


Figure 20. Transient Thermal Impedance (Junction to Case)

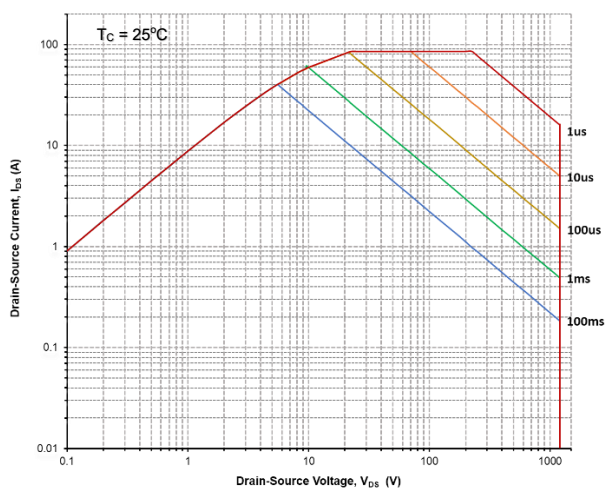


Figure 21. Safe Operating Area

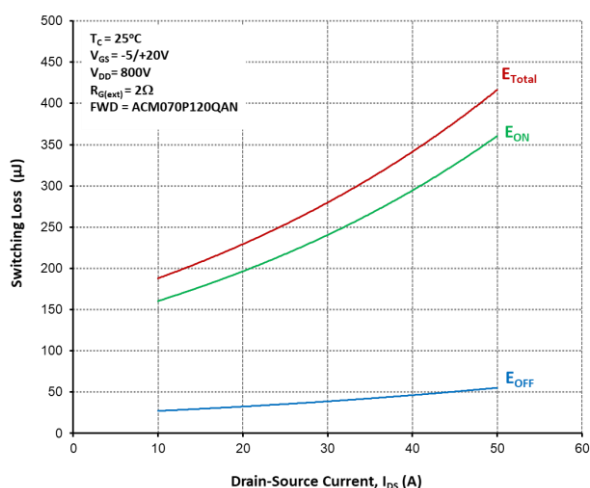


Figure 22. Switching energy vs Drain current

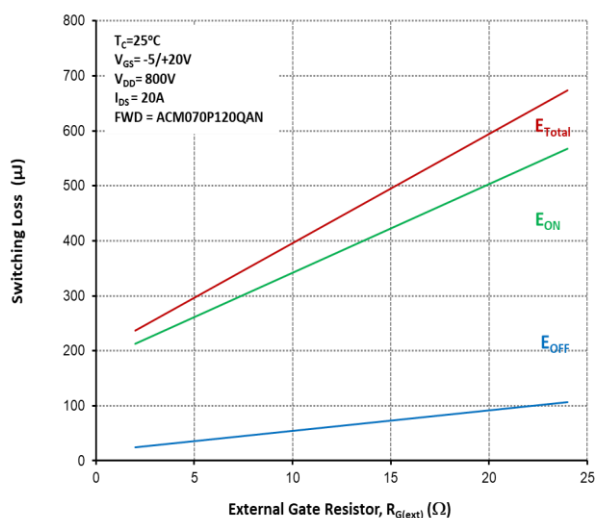


Figure 23. Switching energy vs External Gate Resistor

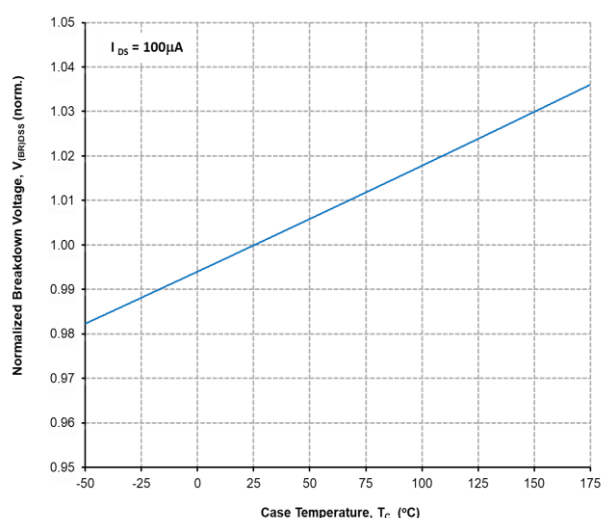
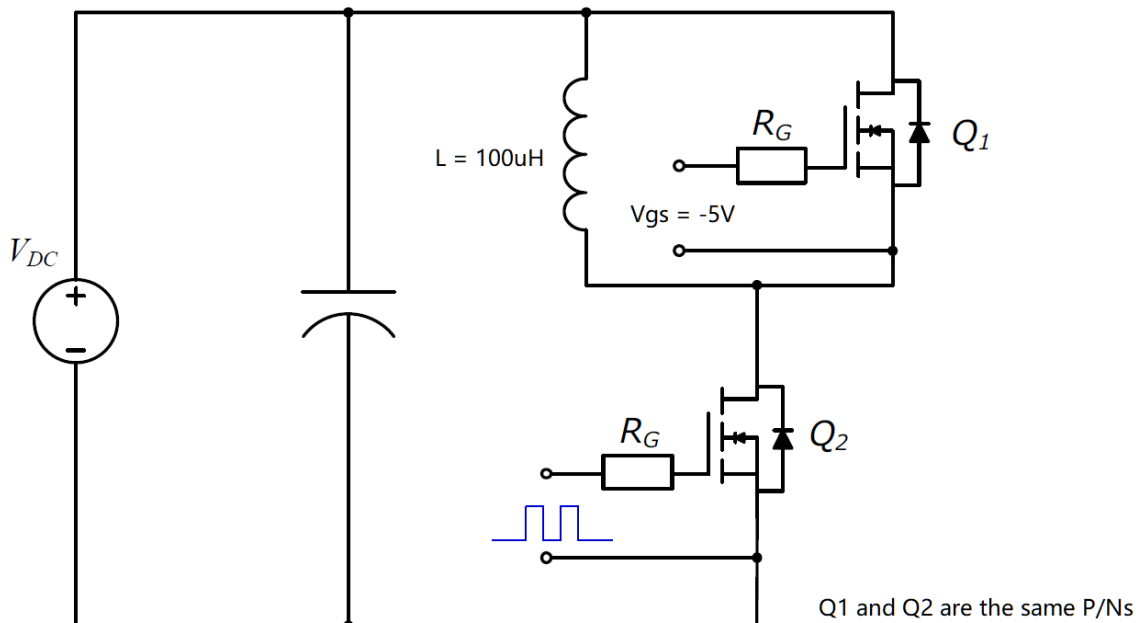
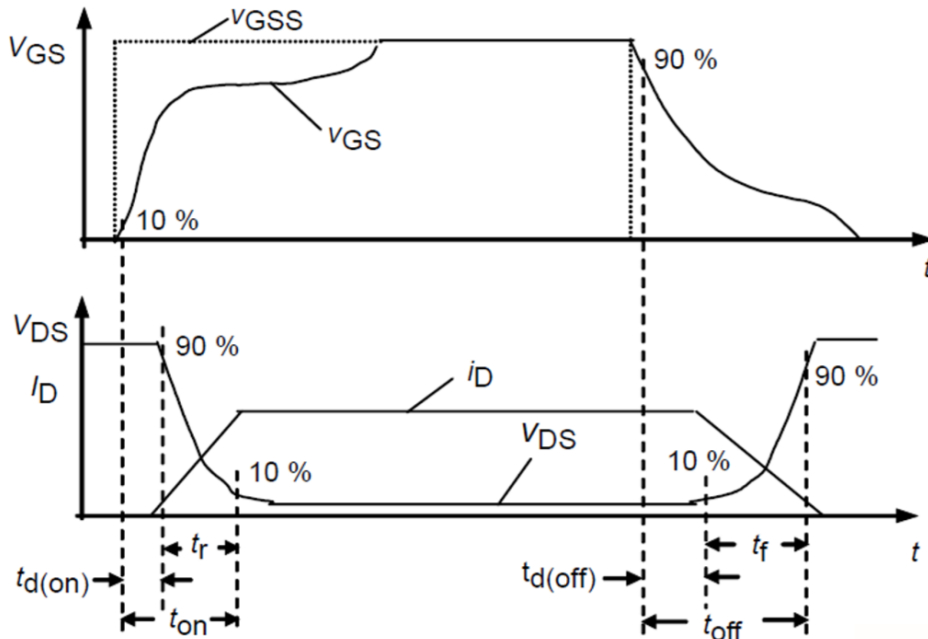


Figure 24. Normalized breakdown voltage vs Temperature

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

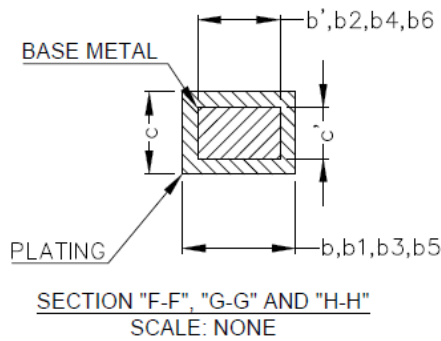
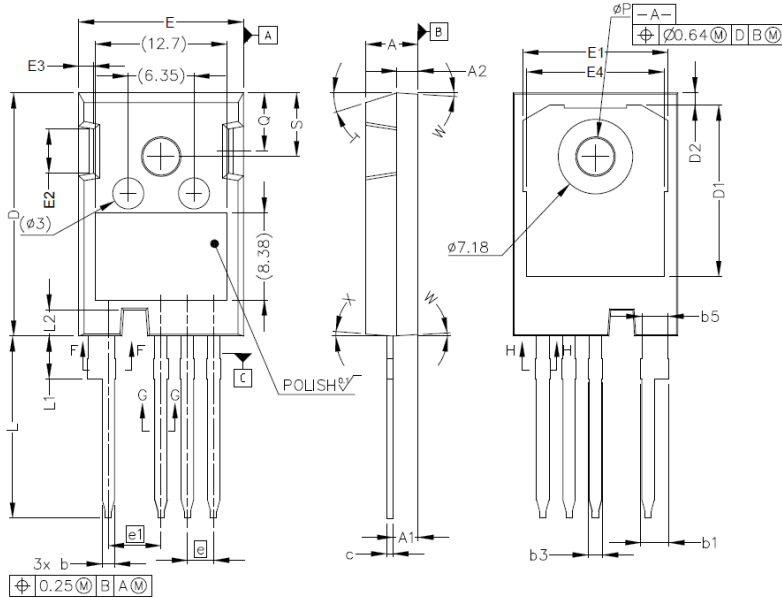
Switching Times Definition and Test Circuit



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Package Dimensions

(TO-247-4 Package)



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.	

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.

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

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