LGE3M14120Q

Silicon Carbide Power MOSFET

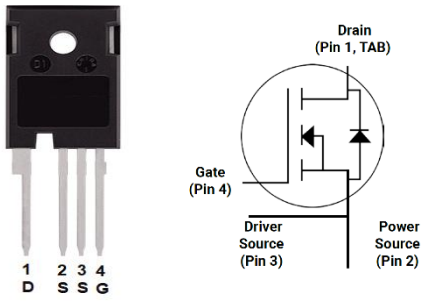
V_{DS} = 1200 V
I_D@25°C = 152A
$R_{DS(ON)}$ = 14mΩ

Features

- High speed switching
- Very low switching losses
- High blocking voltage with low on-resistance
- Temperature independent turn-off switching losses
- Halogen free, RoHS compliant

Benefits

- Cooling effort reduction
- Efficiency improvement
- Reduced cooling requirements
- Increased power density
- Increased system switching frequency



TO-247-4
Pin definition

Applications

- EV motor drive
- PV string inverters
- Solar power optimizer
- Switch mode power supplies

Part Number	Package	Marking
LGE3M14120Q	TO-247-4	LGE3M14120Q

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

1、Maximum ratings

Maximum rating (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{DS,max}$	Drain source voltage	1200	V	V_{GS} = 0 V, I_D = 100 μA	
$V_{GS,max}$	Gate source voltage	-8 /+22	V	Absolute maximum values	
V_{GSop}	Gate source voltage	-4 /+18	V	Recommended operational values	
I_D	Continuous drain current	152	A	V_{GS} = 18 V, T_C = 25°C	Fig.19
		108		V_{GS} = 18 V, T_C = 100°C	
$I_{D(pluse)}$	Pulsed drain current	340	A	Pulse width t_P limited by $T_{j,max}$	Fig.22
P_D	Power dissipation	625	W	T_C=25°C,T_J=175°C	Fig.20
T_J ,T_{stg}	Operating Junction and storage temperature	-40 to +175	°C		
T_L	Soldering temperature	260	°C	1.6mm (0.063") from case for 10s	
T_M	Mounting torque	1 8.8	Nm lbf-in	M3 or 6-32 screw	

2、Thermal characteristics

Thermal characteristics[1]

Symbol	Parameter	Value	Unit	Test Conditions	Note
$R_{th(j-c)}$	Thermal resistance from junction to case	0.24	°C/W		Fig.21
$R_{th(j-a)}$	Thermal resistance from junction to ambient	33			

[1] Not subject to production test. Parameter verified by design/characterization.

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

3、Electrical characteristics

3.1 Static characteristics

Static characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-source breakdown voltage	1200	-	-	V	V_{GS} = 0V, I_D = 100μA	
$V_{GS(th)}$	Gate threshold voltage	2.3	2.8	4	V	V_{DS} = V_{GS}, I_D = 28mA	Fig.11
		-	2.0	-	V	V_{DS} = V_{GS}, I_D = 28mA, TJ=175°C	
I_{DSS}	Zero gate voltage drain current	-	1	100	μA	V_{DS} = 1200V, V_{GS} = 0V	
I_{GSS}	Gate source leakage current	-	-	100	nA	V_{GS} = 18V, V_{DS} = 0V	
$R_{DS(on)}$	Current drain-source on-state resistance	-	17	21	mΩ	V_{GS} = 15V, I_D = 100A	Fig.4,5,6
		-	28	-		V_{GS} = 15V, I_D = 100A, TJ=175°C	
		-	14	18		V_{GS} = 18V, I_D = 100A	
		-	27	-		V_{GS} = 18V, I_D = 100A, TJ=175°C	
gfs	Transconductance	-	71	-	S	V_{DS} = 20V, I_D = 100A	Fig.7
		-	63	-		V_{DS} = 20V, I_D = 100A, TJ=175°C	
$R_{g,int}$	Internal gate resistance	-	0.9	-	Ω	V_{AC} = 25mV, f=1MHz	
V_{SD}	Diode forward voltage	-	4.0	-	V	V_{GS} = -4V, I_{SD} = 50A	Fig.8,9,10
		-	3.5	-		V_{GS} = -4V, I_{SD} = 50A, TJ=175°C	

3.2 Dynamic characteristics

Dynamic characteristics (Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
C_{iss}	Input capacitance	-	5469	-	pF	V_{DS} = 1000V, V_{GS} = 0V TJ = 25°C, V_{AC} = 25mV f=100KHz	Fig.17,18
C_{oss}	Output capacitance	-	235	-			
C_{rss}	Reverse capacitance	-	17.5	-			
E_{oss}	Coss stored energy	-	150	-	μJ		Fig.16

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

Q_{gs}	Gate source charge	-	54	-	nC	V_{DS} = 800V, V_{GS} =-4/+18V I_D = 100A	Fig.12
Q_{gd}	Gate drain charge	-	45	-			
Q_g	Gate charge	-	230	-			

3.3 Switching characteristics

Dynamic characteristics(Tc = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
E_{on}	Turn on switching energy	-	812	-	μJ	V_{DS} = 800V, V_{GS} = -4/+18V I_D = 100A, Rg = 2.5Ω, L = 120uH	Fig.26
E_{off}	Turn off switching energy	-	383	-			
$t_{d\ (on)}$	Turn on delay time	-	19	-	ns		Fig.27, 28
t_r	Rise time	-	29	-			
$t_{d\ (off)}$	Turn off delay time	-	42	-			
t_f	Fall time	-	9.3	-			

Body diode characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode forward voltage	-	4.0	-	V	V_{GS} = -4V, I_{SD} = 50A	Fig.8,9, 10
		-	3.5	-	V	V_{GS} = -4V, I_{SD} = 50A T_J = 175°C	
I_S	Continuous diode forward current	-	152	-	A	V_{GS} = -4V, Tc = 25°C	
t_{rr}	Reverse recovery time	-	66	-	nS	V_R = 800V, V_{GS} = -4V I_D = 100A di/dt = 3000A/μS, T_J = 175°C	
Q_{rr}	Reverse recovery charge	-	1830	-	nC		
I_{rrm}	Peak reverse recovery current	-	52	-	A		

Note : When using SiC Body Diode the maximum recommended V_{GS} = -4 V

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

4、Electrical characteristic diagrams

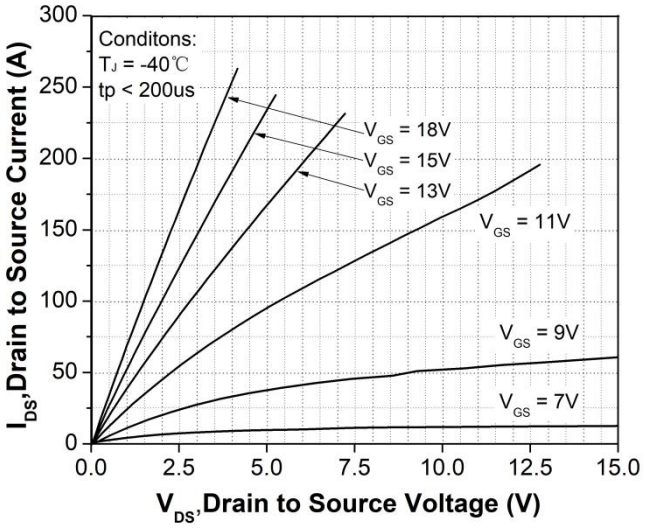


Figure 1. Output characteristics T_J = -40 ºC

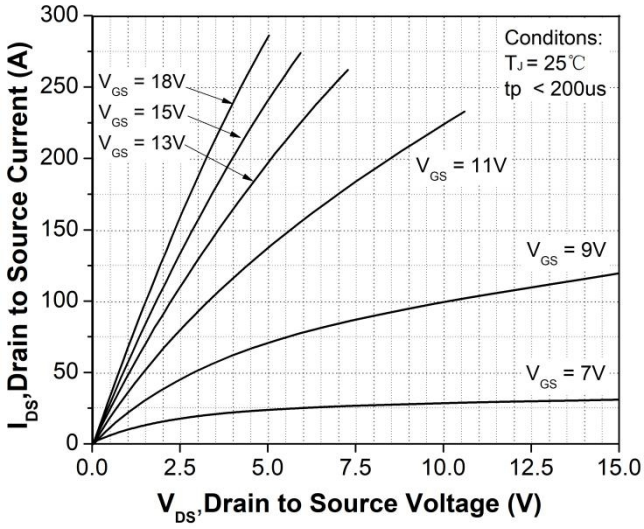


Figure 2. Output characteristics T_J = 25 ºC

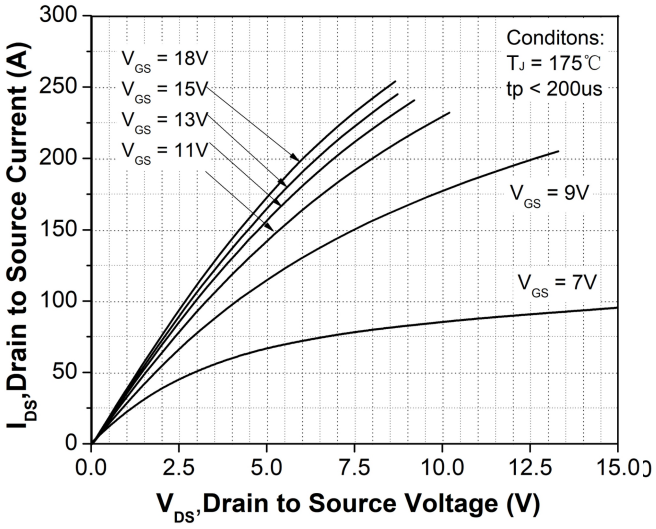


Figure 3. Output characteristics T_J = 175 ºC

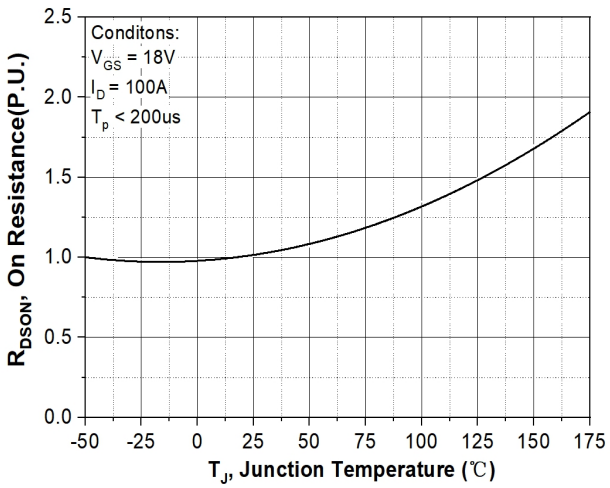


Figure 4. Normalized on-resistance vs. temperature

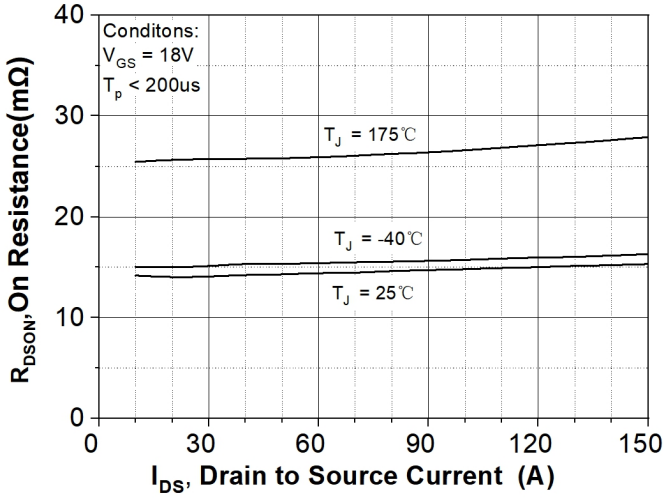


Figure 5. On-resistance vs. drain current

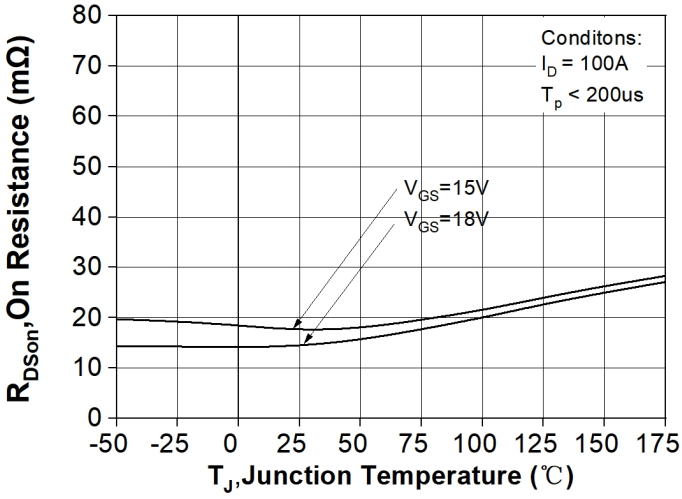


Figure 6. On-resistance vs. temperature for various gate voltage

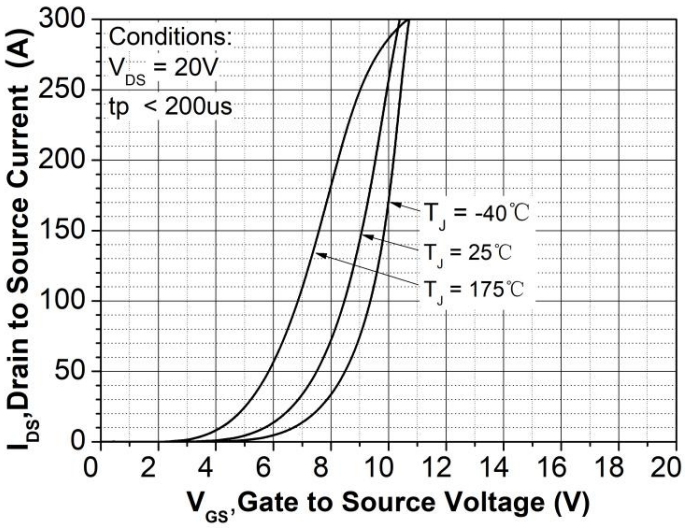


Figure 7. Transfer characteristic for various junction temperatures

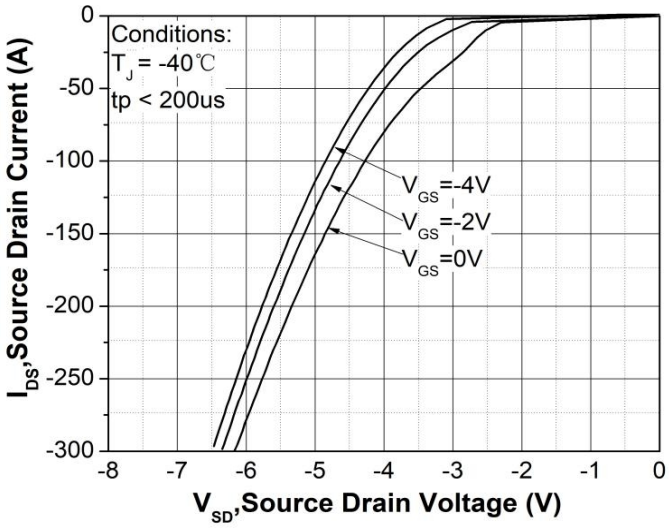


Figure 8. Body diode characteristic at T_J = -40 ºC

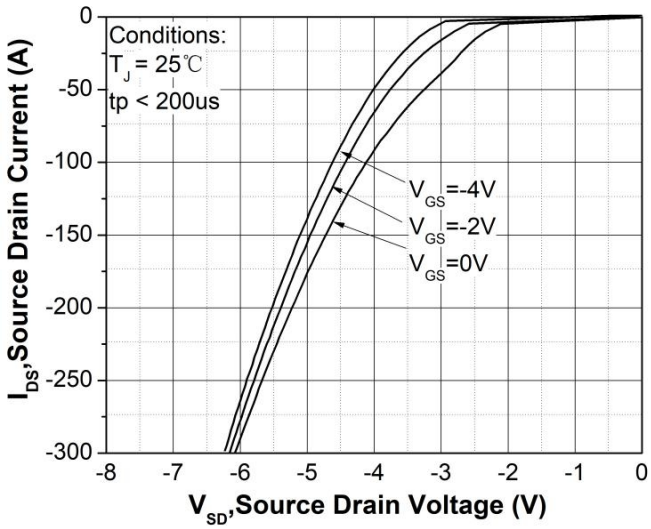


Figure 9. Body diode characteristic at T = 25 ºC

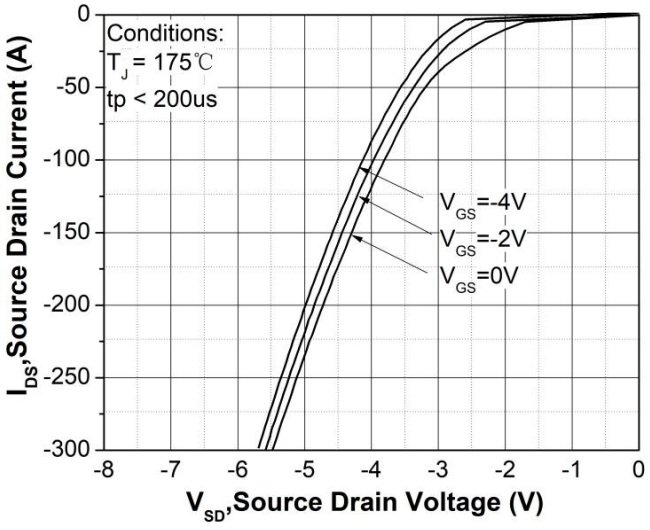


Figure 10. Body diode characteristic at T = 175ºC

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

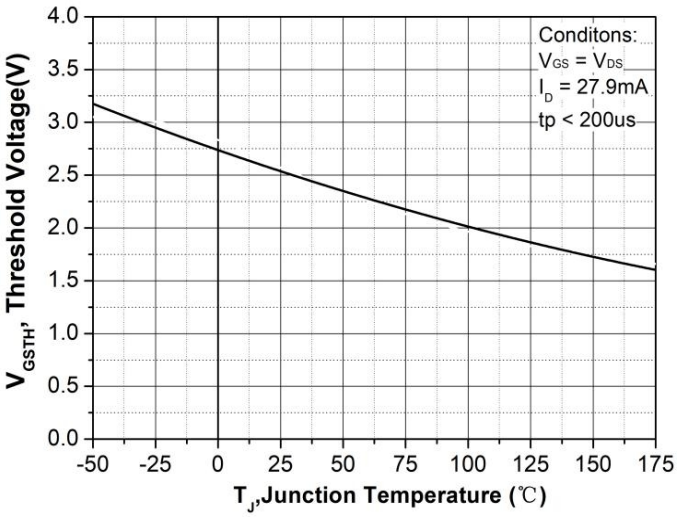


Figure 11. Threshold voltage vs. temperature

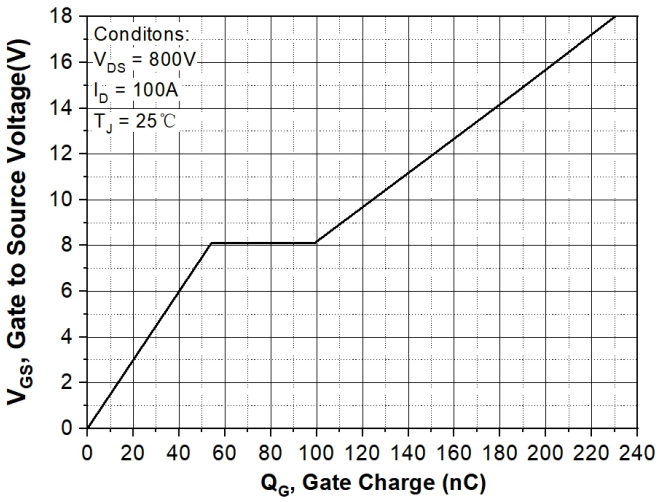


Figure 12. Gate charge characteristic

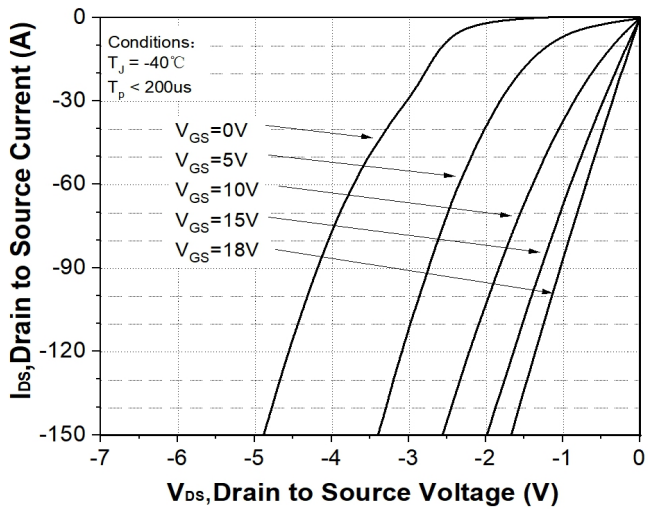


Figure 13. 3rd quadrant characteristic at T_J = -40 ºC

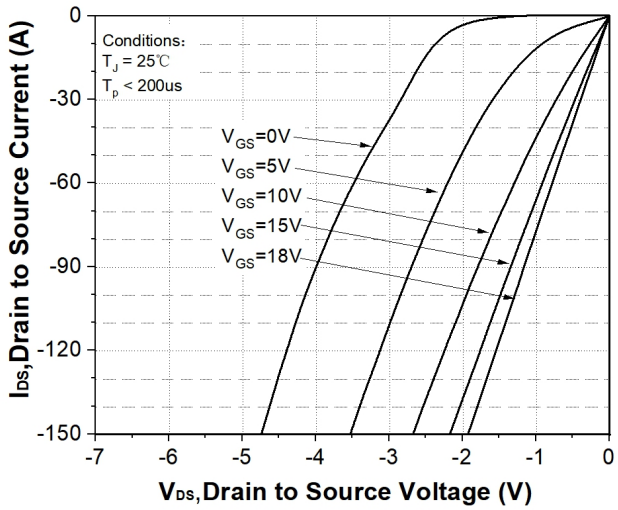


Figure 14. 3rd quadrant characteristic at T_J = 25 ºC

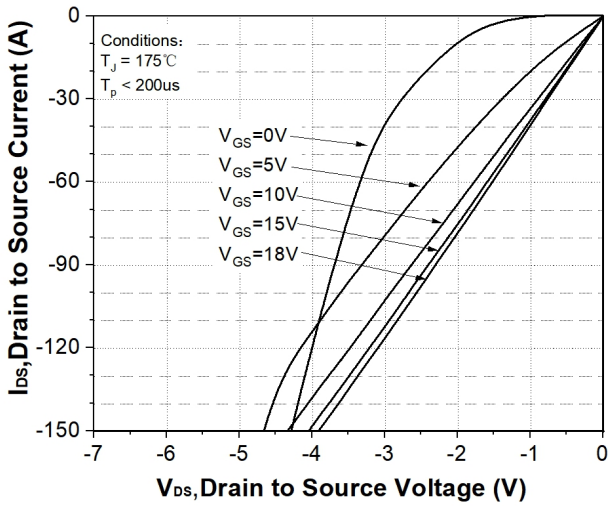


Figure 15. 3rd quadrant characteristic at T_J = 175 ºC

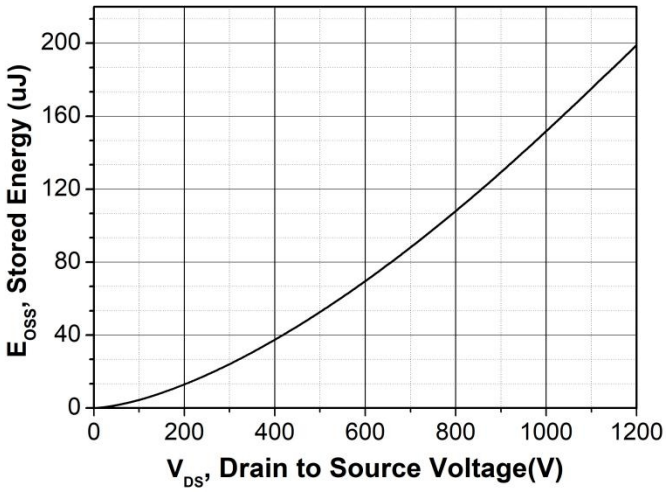


Figure 16. Output capacitor stored energy

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

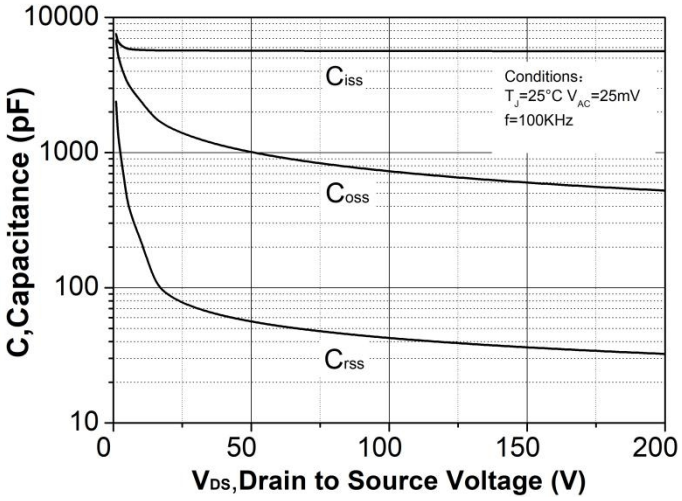


Figure 17. Capacitances vs. drain-source voltage (0 - 200V)

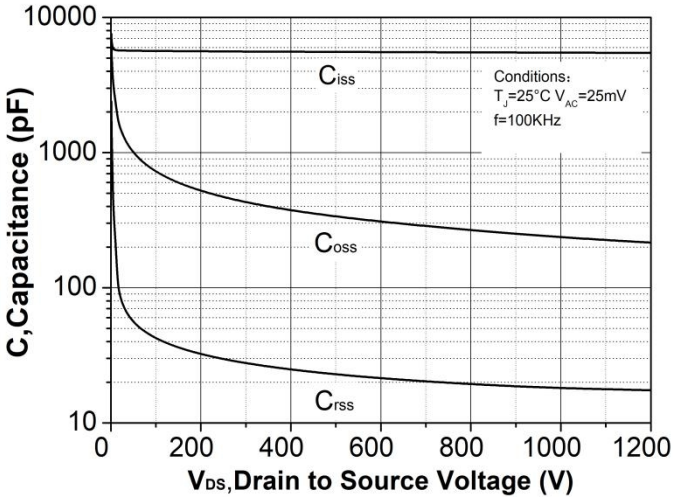


Figure 18. Capacitances vs. drain-source voltage (0 - 1200V)

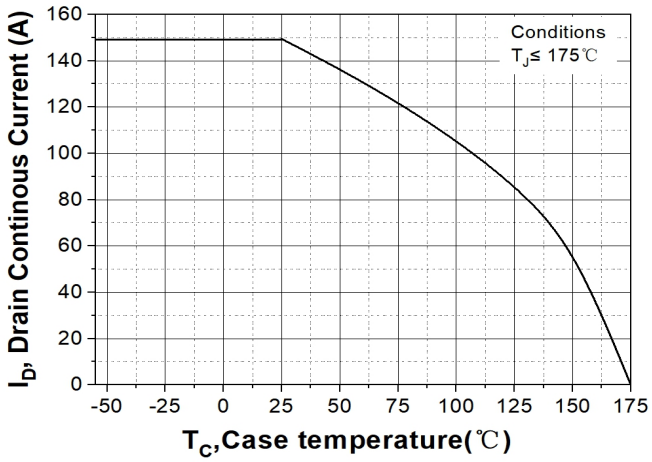


Figure 19. Continuous drain current derating vs.case temperature

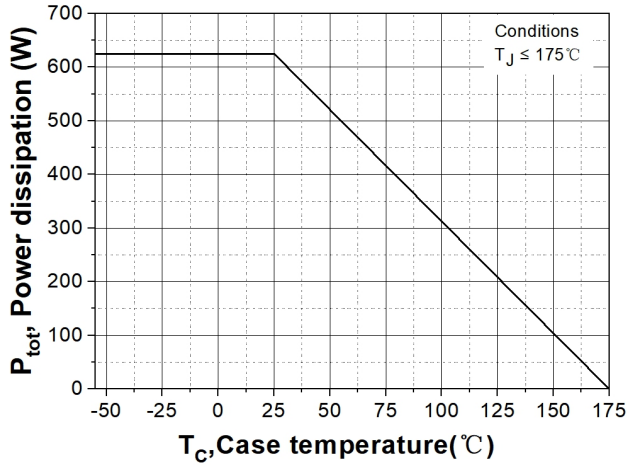


Figure 20. Maximum power dissipation derating vs. case temperature

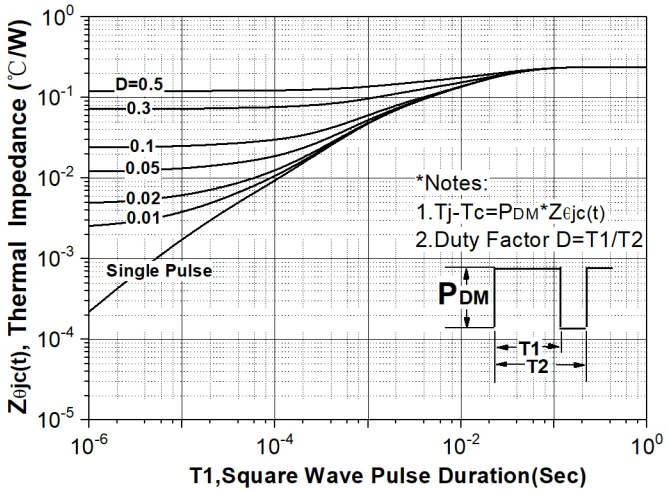


Figure 21. Transient thermal impedance (junction - case)

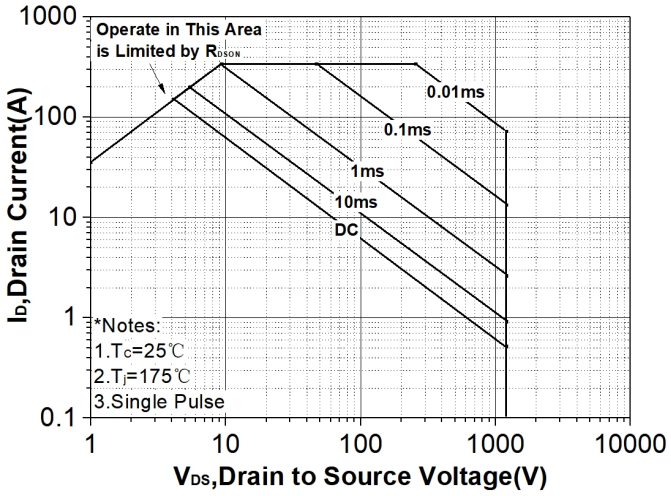


Figure 22. Safe operating area

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

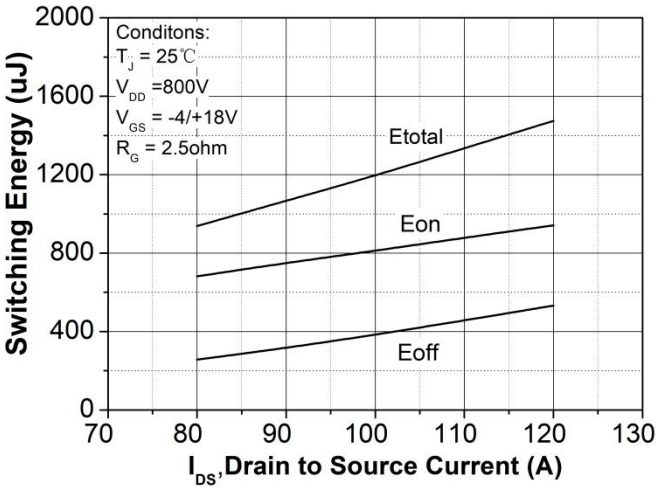


Figure 23. Clamped Inductive switching energy vs. drain current (V_{DD} = 800V)

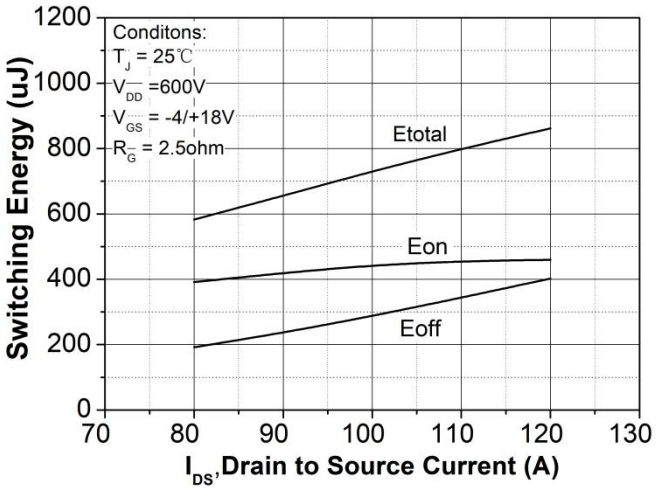


Figure 24. Clamped inductive switching energy vs. drain current (V_{DD} = 600V)

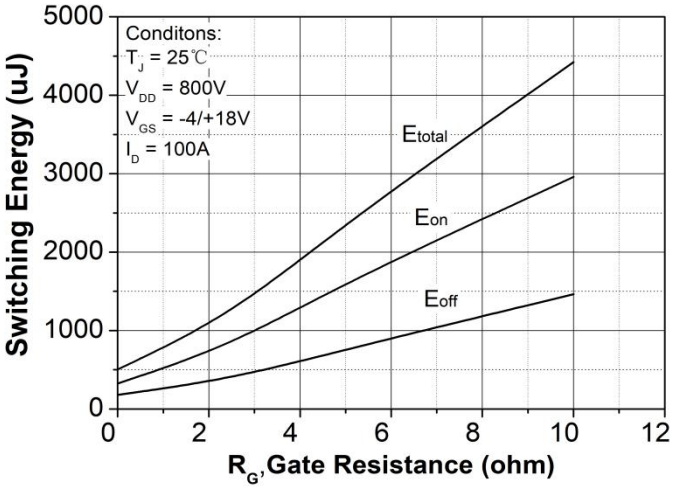


Figure 25. Clamped inductive switching energy vs. R_G(ext)

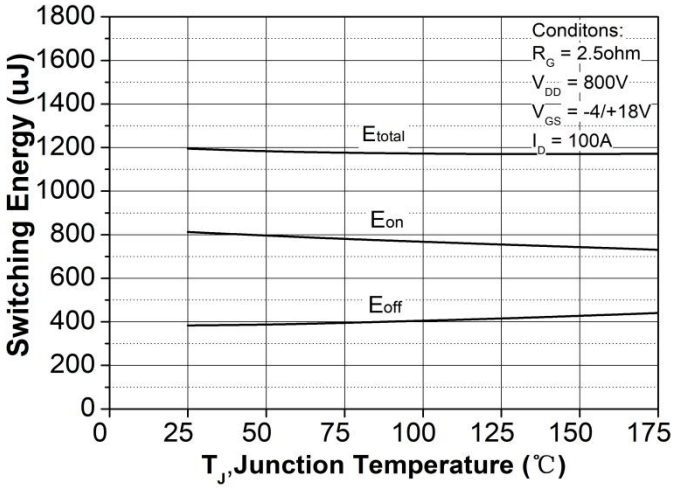


Figure 26. Clamped inductive switching energy vs. temperature

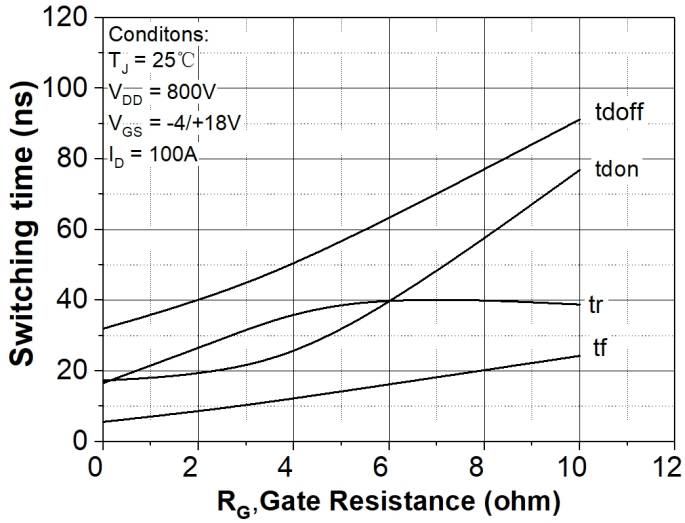
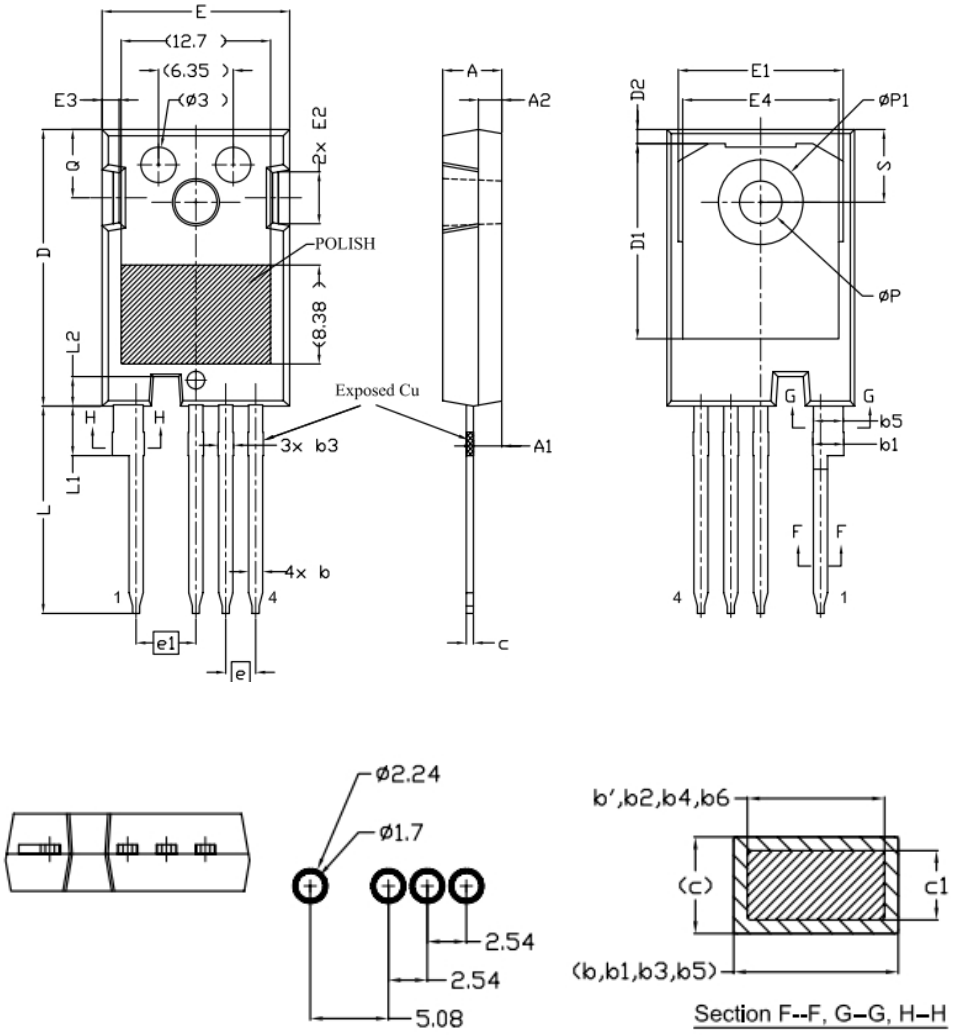


Figure 27. Switching times vs. R_G(ext)

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

5、Package drawing (TO-247-4L)



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
b'	1.07	1.20	1.28
b	1.07	1.20	1.33
b1	2.39	2.67	2.94
b2	2.39	2.67	2.84
b3	1.07	1.30	1.60
b4	1.07	1.30	1.50
b5	2.39	2.53	2.69
b6	2.39	2.53	2.64
c	0.55	0.60	0.68
c1	0.55	0.60	0.65
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
E	15.75	15.94	16.13
E1	13.10	14.02	14.15
E2	3.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
e	2.54 BSC		
e1	5.08 BSC		
L	17.31	17.57	17.82
L1	3.97	4.19	4.37
L2	2.35	2.50	2.65
ØP	3.51	3.61	3.65
ØP1	7.19 REF.		
Q	5.49	5.79	6.00
S	6.04	6.17	6.30

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

6、Test conditions

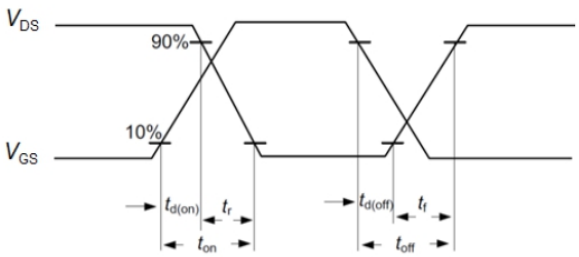


Figure A. Definition of switching times

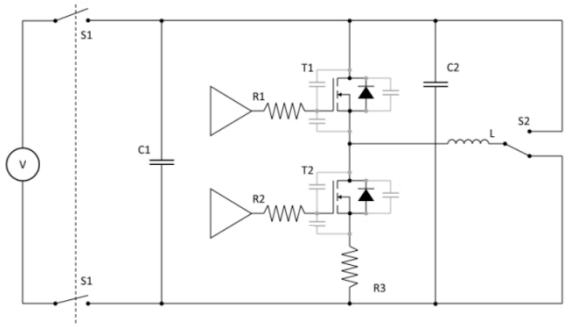


Figure B. Dynamic test circuit

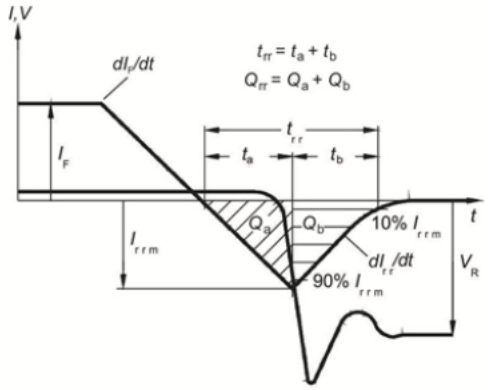


Figure C. **Definition of diode switching characteristics**

Figure C. Definition of body diode switching characteristics

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.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.