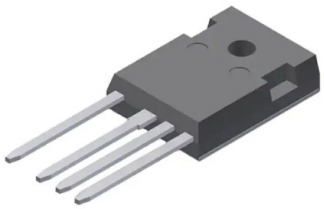
Gen3 3300V 50mΩ Sic Mosfet Bare Die
QS50SCM330U61

Features

- 3 rd Generation SiC MOSFET Technology with +15~+18V gate drive
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- 175°C operating junction temperature capability
- Ultra fast and robust intrinsic body diode



Applications

- Transportation traction inverters
- Medical application
- High voltage DC-DC converters
- AC/DC power supplies

Part Number	Die Size	Marking
QS50SCM330X61	Please contact your sales representative to get the detailed die information	Q

Absolute Maximum Ratings (Tc=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	TestConditions	Note
Vds	Drain-Source voltage	3300	V	Vgs=0V, Id=100μA	
Vgsmax (Transient)	Maximum transient voltage	-10 to 23	V	Dutycycle<1%,and pulse width<200ns	
Vgson	Recommended turn-on voltage	15 to 18	V		
Vgsoff	Recommended turn-off voltage	-5 to -2	V	Typical-3.5V	
Id	Drain current (continuous)	61	A	Vgs=18V, Tc=25°C	Fig.23
		45	A	Vgs=18V, Tc=100°C	
Idm	Drain current (pulsed)	152	A	Pulse width limited by SOA and dynamic Rθ(j-c)	Fig. 25,26
Ism	Body diode current (pulsed)	152	A	Pulse width limited by SOA and dynamic Rθ(j-c)	Fig. 25,26
Ptot	Total power dissipation	600	W	Tc=25°C	Fig.24
Tstg	Storage temperature range	-55 to 175	°C		
Tj	Operating junction temperature	-55 to 175	°C		
Tl	Solder Temperature	260	°C	wave soldering only allowed at leads,1.6mm from case for 10 s	

Note1: Assumes Rθ(j-c)< 0.3°C/W.

Note2: All the electrical data and curve data please refer to datasheet for packaged device which part number is QSDN20045X.

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

Symbol	Parameter	Value			Unit	TestConditions	Note
		Min.	Typ.	Max.			
Idss	Zero gate voltage drain current		5	100	μA	Vds=3300V, Vgs=0V	
Igss	Gate leakage current			±100	nA	Vds=0V, Vgs=-5~20V	
Vth	Gate threshold voltage	2.0	3.0	4.0	V	Vgs=Vds, Id=7mA	Fig. 8, 9
			2.3		V	Vgs=Vds, Id=7mA @Tj=175°C	
Ron	Staticdrain-source on-resistance		50	65	mΩ	Vgs=18V, Id=25A @Tj=25°C	Fig. 4,5,6,7
			145		mΩ	Vgs=18V, Id=25A @Tj=175°C	
			56		mΩ	Vgs=15V, Id=25A @Tj=25°C	
			147		mΩ	Vgs=15V,Id=25A @Tj=175°C	
Ciss	Input capacitance		6151		pF	Vds=1700V, Vgs=0V, f=100kHz, Vac=25mV	Fig. 16
Coss	Output capacitance		95.4		pF		
Crss	Reverse transfer capacitance		0.75		pF		
Eoss	Coss stored energy		182		μJ		Fig.17
Qg	Total gate charge		218		nC	Vds=1700V, Id=10A, Vgs=-3 to 18V	Fig. 18
Qgs	Gate-source charge		67		nC		
Qgd	Gate-drain charge		44		nC		
Rg	Gate input resistance		1.9		Ω	f=1MHz	
Eon	Turn-on switching energy		1927		μJ	Vds=1700V, Id=30A, Vgs=-3.5 to 18V, Rg(Ext)=3.3Ω, L=400μH Tj=25°C	Fig. 19,20
Eoff	Turn-off switching energy		301		μJ		
td(on)	Turn-on delay time		20.6		ns		
tr	Rise time		25.8				
td(off)	Turn-off delay time		32				
tf	Fall time		19.6				
Eon	Turn-on switching energy		2497		μJ	Vds=1700V, Id=30A, Vgs=-3.5 to 18V, Rg(ext)=3.3Ω, L=200μH Tj=175°C	Fig. 22
Eoff	Turn-off switching energy		305		μJ		

Reverse Diode Characteristics (Tc=25°C unless otherwise specified

Symbol	Parameter	Value			Unit	TestConditions	Note
		Min.	Typ.	Max.			
Vsd	Diodeforwardvoltage		3.7		V	Isd=20A, Vgs=0V	Fig.10, 11,12
			4.4		V	Isd=20A, Vgs=0V, Tj=175°C	
IS	Diodeforwardcurrent (continuous)			99.4	A	Vgs=-2V, Tc=25°C	
				56	A	Vgs=-2V, Tc=100°C	
trr	Reverserecoverytime		46.1		ns	Vgs=-3.5V/+18V, Isd=30A, VR=1700V, Rg(ext)=7.5Ω L=400µ Hdi/dt=3000A/µs	
Qrr	Reverserecoverycharge		506.7		nC		
Irrm	Peakreverserecoverycurrent		43.5		A		

Typical Performance (curves)

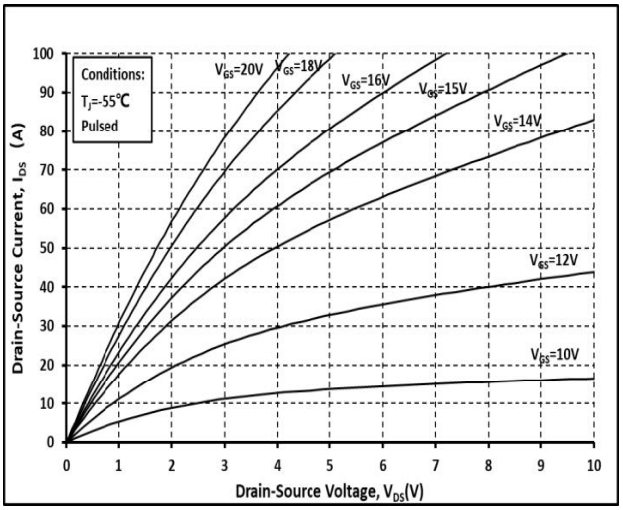


Fig. 1 Output Curve @ Tj=-55°C

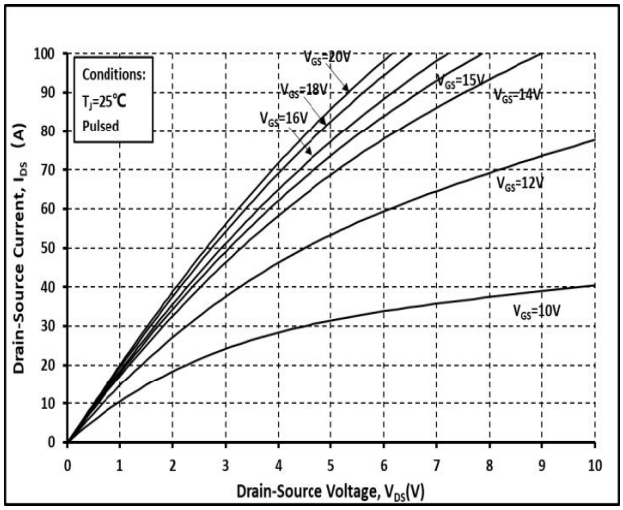


Fig. 2 Output Curve @ Tj=25°C

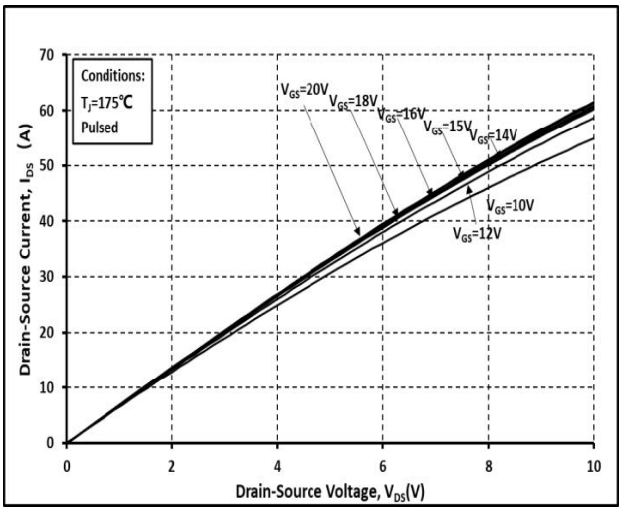


Fig. 3 Output Curve @ Tj=175°C

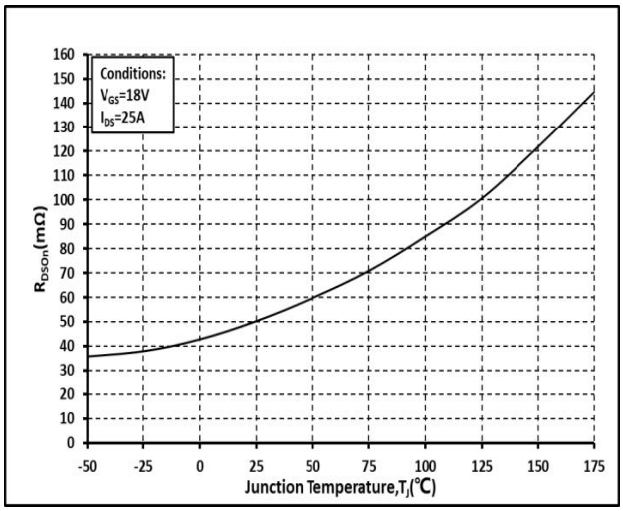


Fig. 4 Ron vs. Temperature

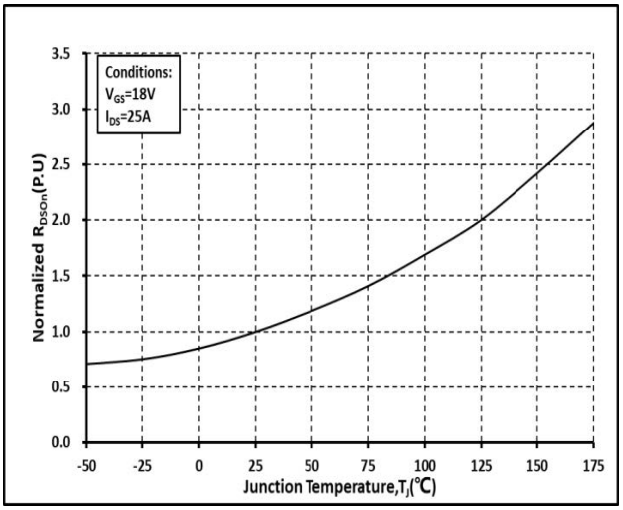


Fig. 5 Normalized Ron vs. Temperature

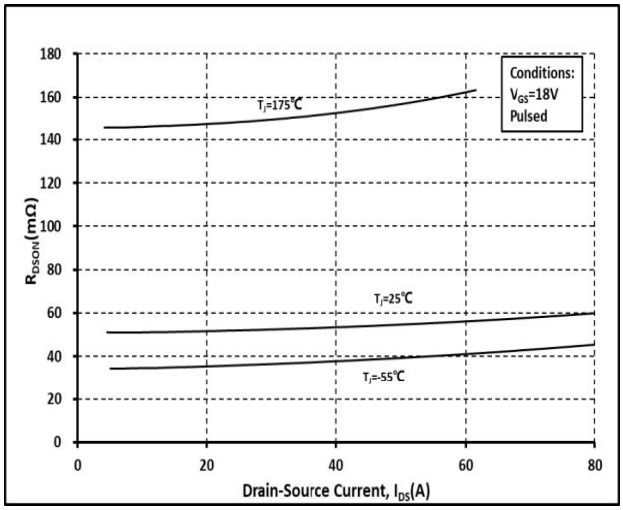


Fig. 6 Ron vs. Ids @ Various Temperature

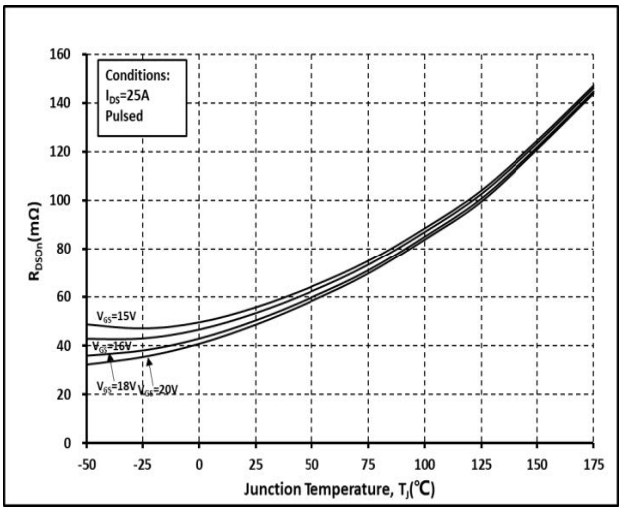


Fig. 7 Ron vs. Temperature @ Various Vgs

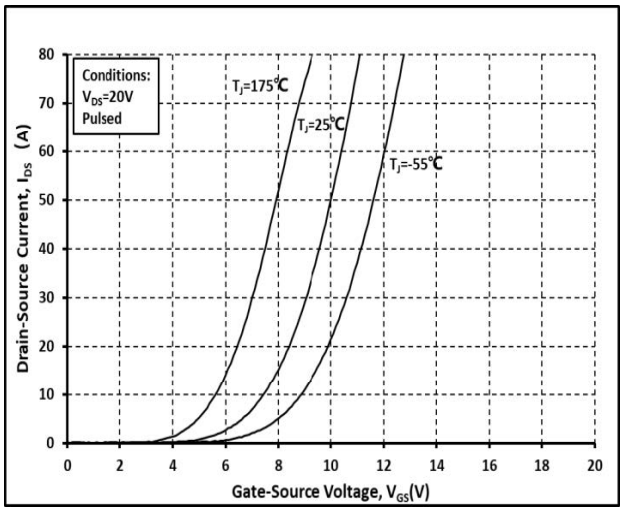


Fig. 8 Transfer Curves @ Various Temperature

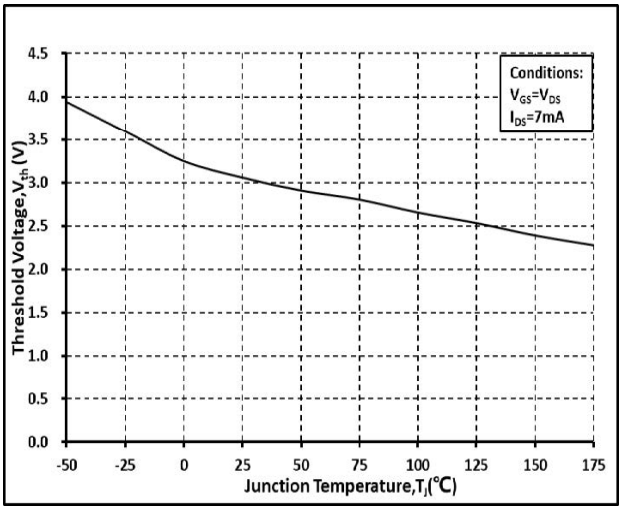


Fig. 9 Threshold Voltage vs. Temperature

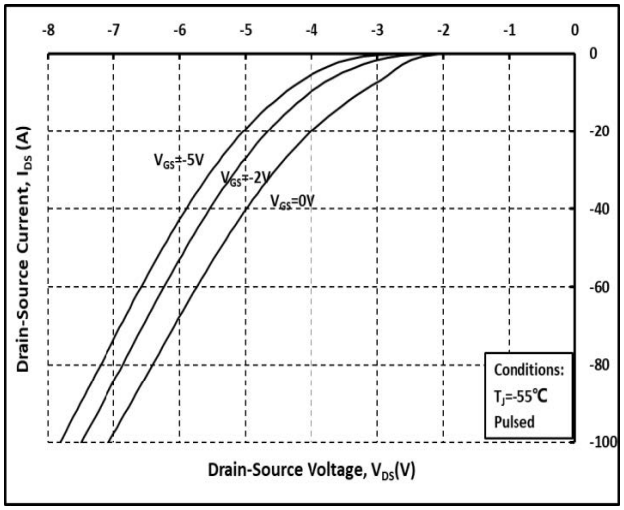


Fig. 10 Body Diode curves @ Tj=-55°C

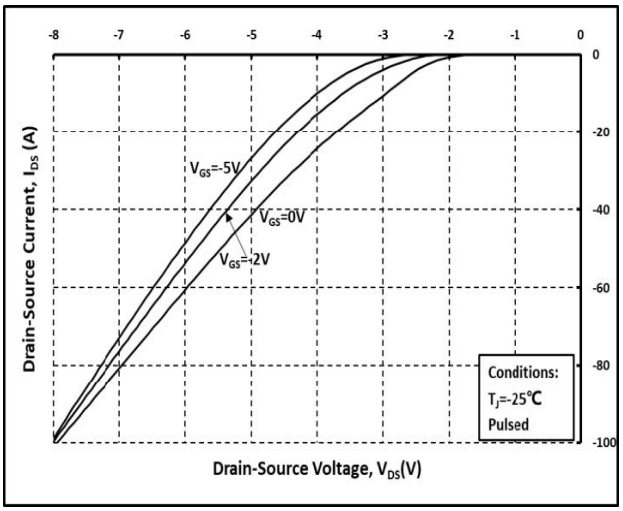


Fig. 11 Body Diode curves @ Tj=25°C

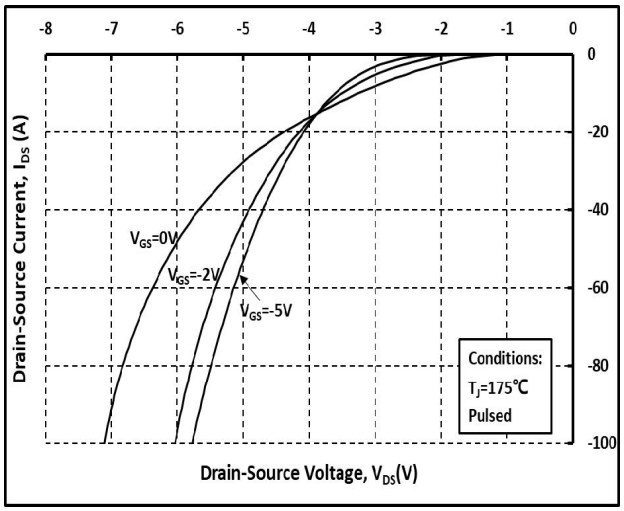


Fig. 12 Body Diode curves @ Tj=175°C

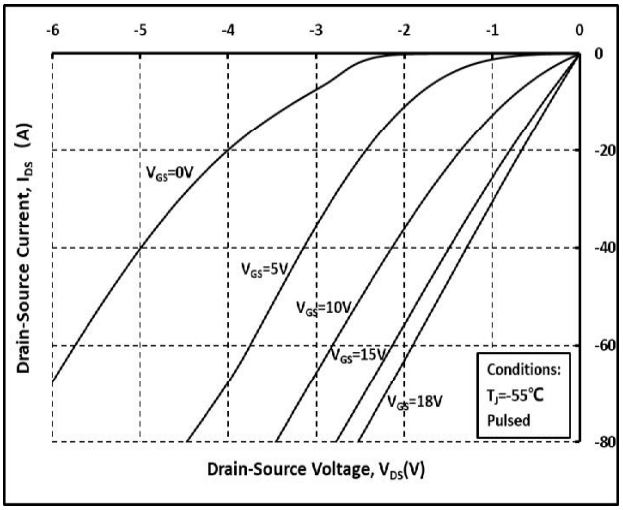


Fig. 13 3rd Quadrant curves @ Tj=-55°C

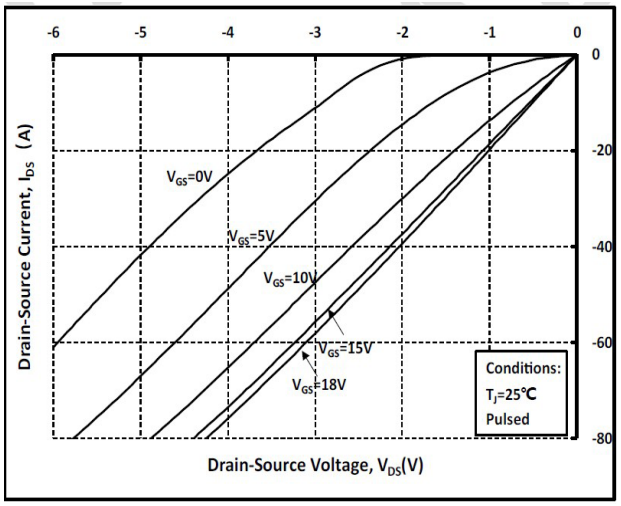


Fig. 14 3rd Quadrant curves @ Tj=25°C

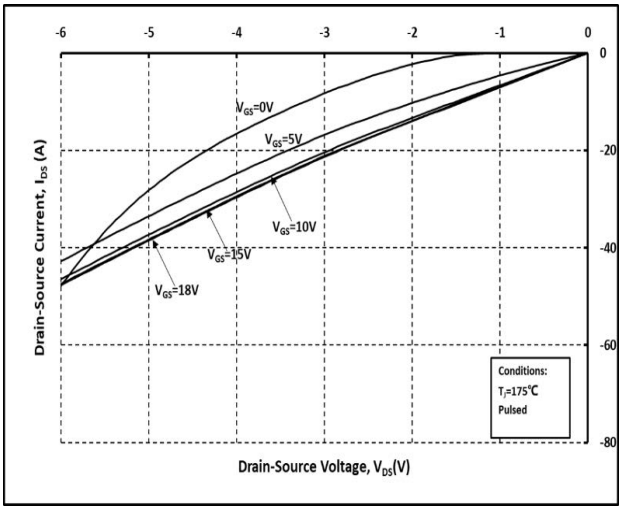


Fig. 15 3rd Quadrant curves @ Tj=175°C

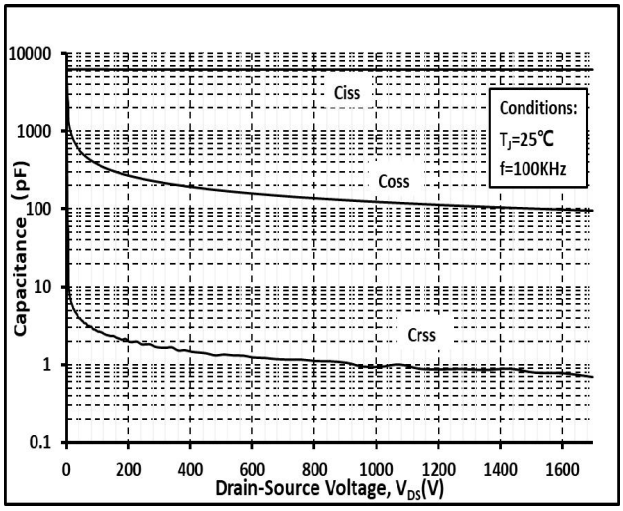


Fig. 16 Capacitance vs. Vds

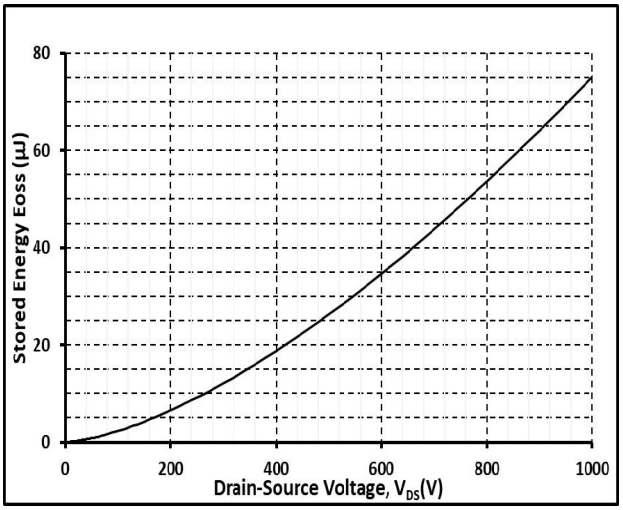


Fig. 17 Output Capacitor Stored Energy

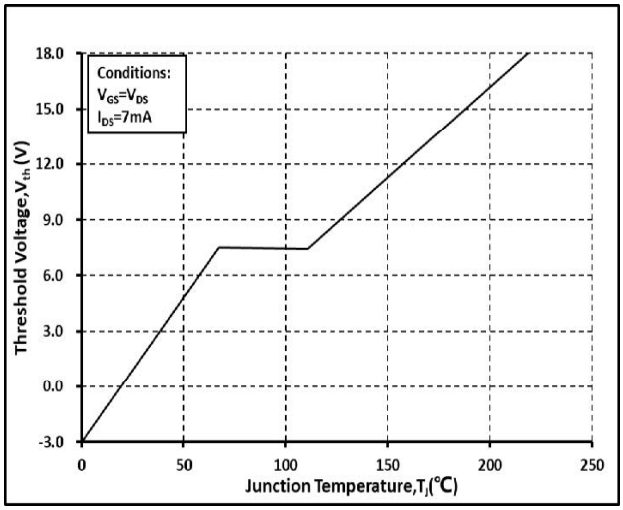


Fig. 18 Gate Charge Characteristics

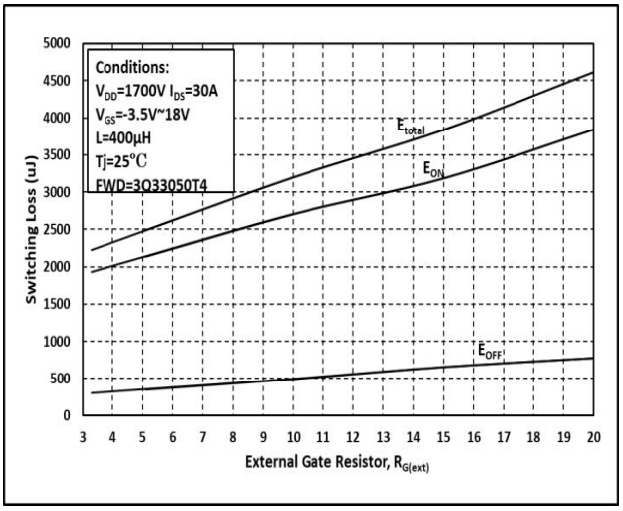


Fig. 19 Switching Energy vs. Rg(ext)

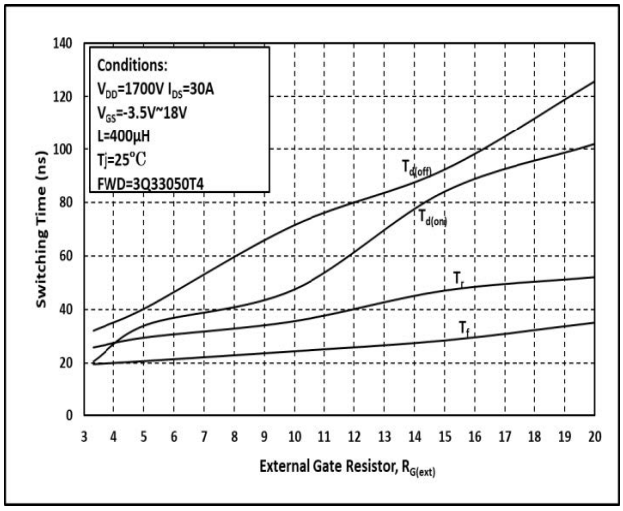


Fig. 20 Switching Times vs. Rg(ext)

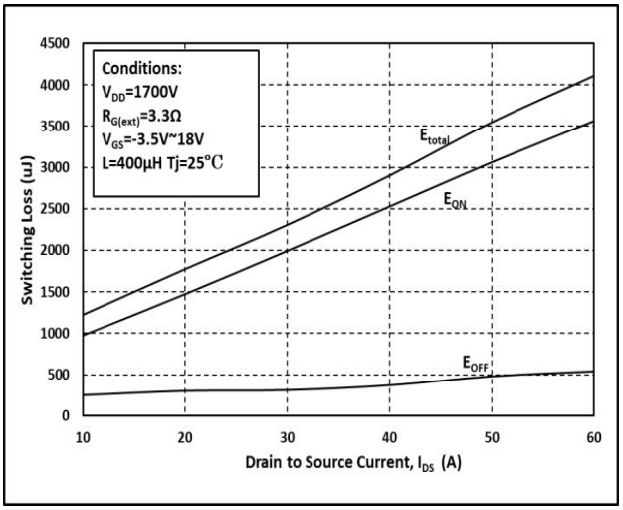


Fig. 21 Switching Energy vs. Ids

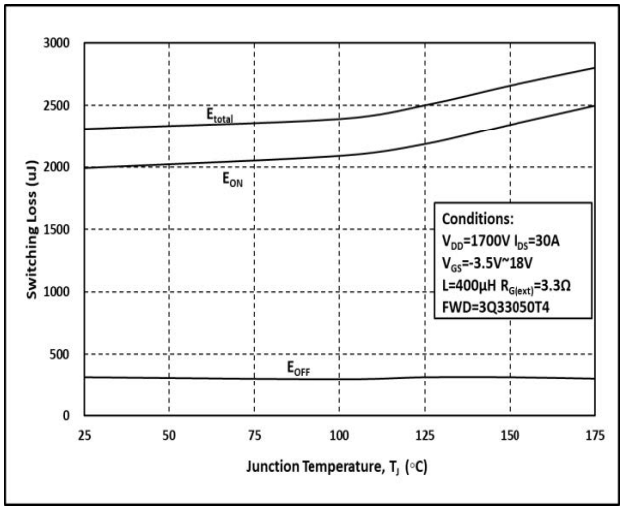


Fig. 22 Switching Energy vs. Temperature

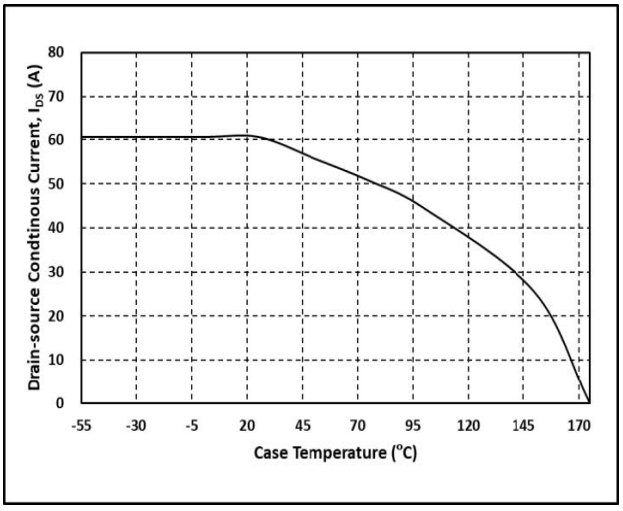


Fig. 23 Continuous Drain Current vs. Case Temperature

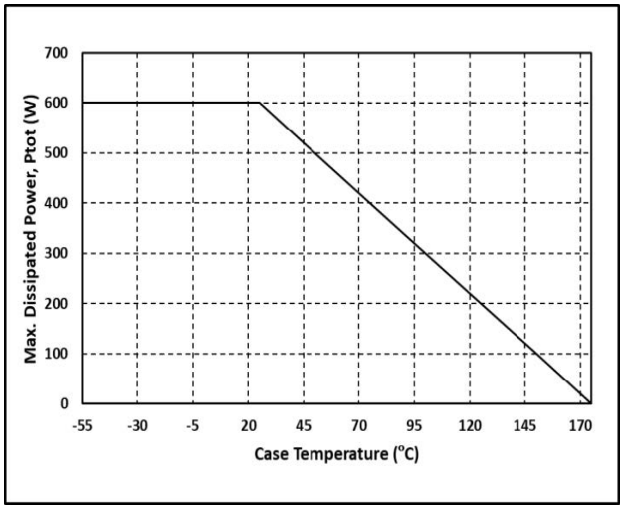


Fig. 24 Max. Power Dissipation Derating vs. Case Temperature

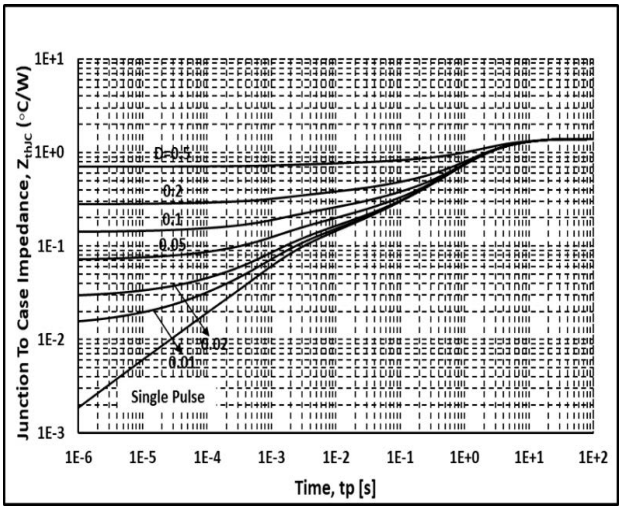


Fig. 25 Thermal impedance

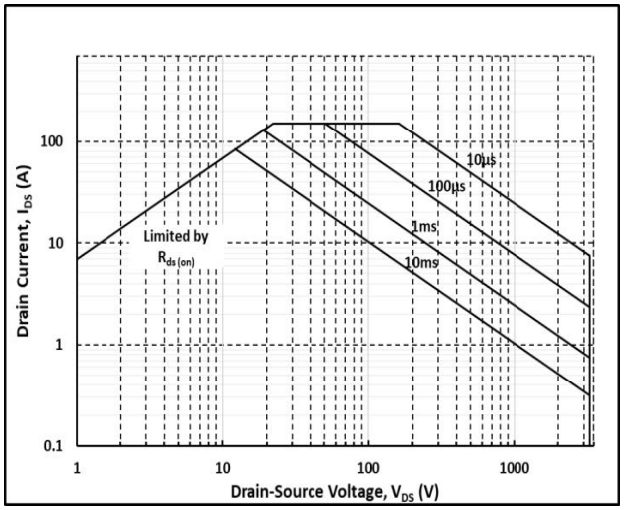


Fig. 26 Safe Operating Area

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- We assume no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Silicon products described or contained herein.

- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc.