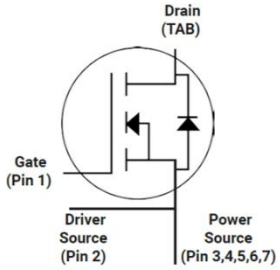
IV1Q12050D7Z– 1200V 50mΩ Automotive SiC MOSFET

Features

- Low impedance package with driver source pin
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode

Outline:



TO263-7

Applications

- Solar inverters
- EV battery chargers
- High voltage DC/DC converters
- Switch mode power supplies

Marking Diagram:

YYWWZ
XXXX
1Q12050D7Z

1Q12050D7Z = Specific Device Code
YY = Year
WW = Work Week
Z = Assembly Location
XXXX = Lot Traceability

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

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DS}	Drain-Source voltage	1200	V	V_{GS}=0V, I_D=100μA	
V_{GSmax} (DC)	Maximum DC voltage	-5 to 22	V	Static (DC)	
V_{GSmax} (Spike)	Maximum spike voltage	-10 to 25	V	<1% duty cycle, and pulse width<200ns	
V_{GSon}	Recommended turn-on voltage	20±0.5	V		
V_{GSoff}	Recommended turn-off voltage	-3.5 to -2	V		
I_D	Drain current (continuous)	50	A	V_{GS}=20V, T_C=25°C	Fig. 21
		37	A	V_{GS}=20V, T_C=100°C	
I_{DM}	Drain current (pulsed)	125	A	Pulse width limited by SOA	Fig. 24
P_{TOT}	Total power dissipation	240	W	T_C=25°C	Fig. 22
T_{stg}	Storage temperature range	-55 to 175	°C		
T_J	Operating junction temperature	-55 to 175	°C		

Thermal Data

Symbol	Parameter	Value	Unit	Note
$R_{\theta(J-C)}$	Thermal Resistance from Junction to Case	0.623	°C/W	Fig. 23

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

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
I_{DSS}	Zero gate voltage drain current		5	100	μA	V_{DS}=1200V, V_{GS}=0V	
I_{GSS}	Gate leakage current			±100	nA	V_{DS}=0V, V_{GS}=-5~20V	
V_{TH}	Gate threshold voltage	1.8	3.2	5	V	V_{GS}=V_{DS}, I_D=6mA	Fig. 8, 9
			2.2			V_{GS}=V_{DS}, I_D=6mA @ T_J=175°C	
R_{ON}	Static drain-source on-resistance		50	65	mΩ	V_{GS}=20V, I_D=20A @T_J=25°C	Fig. 4, 5, 6, 7
			80		mΩ	V_{GS}=20V, I_D=20A @T_J=175°C	
C_{iss}	Input capacitance		2750		pF	V_{DS}=800V, V_{GS}=0V, f=1MHz, V_{AC}=25mV	Fig. 16
C_{oss}	Output capacitance		106		pF		
C_{rss}	Reverse transfer capacitance		5.2		pF		
E_{oss}	C_{oss} stored energy		43		μJ		Fig. 17
Q_g	Total gate charge		120		nC	V_{DS}=800V, I_D=20A, V_{GS}=-5 to 20V	Fig. 18
Q_{gs}	Gate-source charge		25		nC		
Q_{gd}	Gate-drain charge		48		nC		
R_g	Gate input resistance		2.8		Ω	f=1MHz	
E_{ON}	Turn-on switching energy		496.5		μJ	V_{DS}=800V, I_D=30A, V_{GS}=-3.5 to 20V, $R_{G(ext)}$=3.3Ω, L=270μH	Fig. 19, 20
E_{OFF}	Turn-off switching energy		93		μJ		
$t_{d(on)}$	Turn-on delay time		13.8		ns		
t_r	Rise time		21.2				
$t_{d(off)}$	Turn-off delay time		25.4				
t_f	Fall time		12.6				

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

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
V_{SD}	Diode forward voltage		4.9		V	I_{SD}=20A, V_{GS}=0V	Fig. 10, 11, 12
			4.4		V	I_{SD}=20A, V_{GS}=0V, T_J=175°C	
t_{rr}	Reverse recovery time		49.1		ns	V_{GS}=-3.5 to 20V, V_{DS}=800V, I_D=30A, di/dt=2A/ns $R_{G(ext)}$=20Ω, L=270μH	
Q_{rr}	Reverse recovery charge		289		nC		
I_{RRM}	Peak reverse recovery current		13.8		A		

Typical Performance (curves)

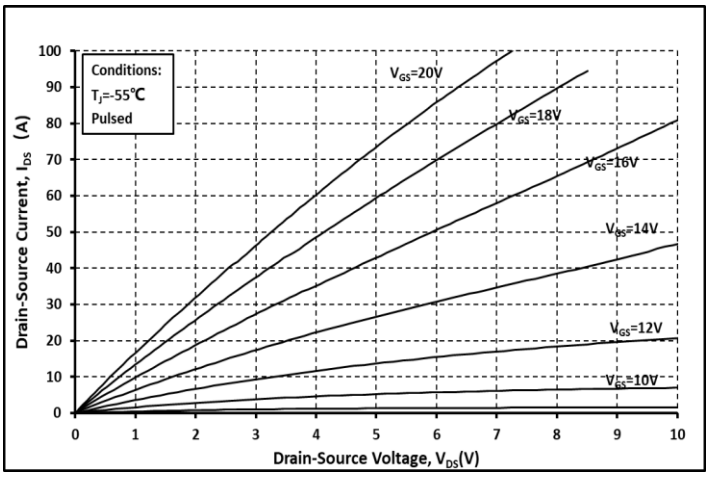


Fig. 1 Output Curve @ T_J=-55℃

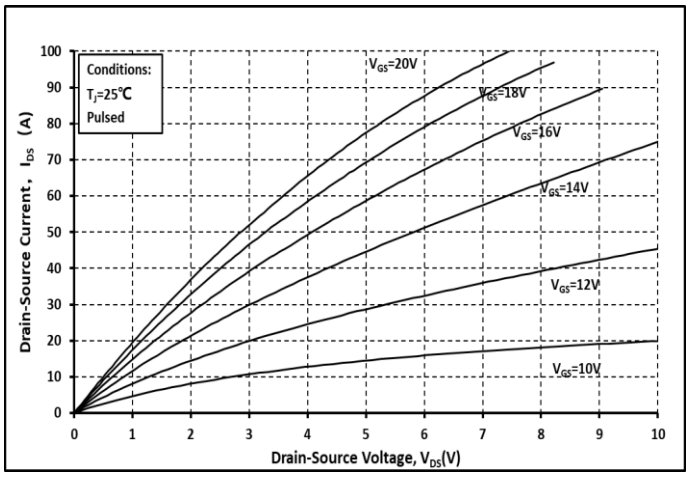


Fig. 2 Output Curve @ T_J=25℃

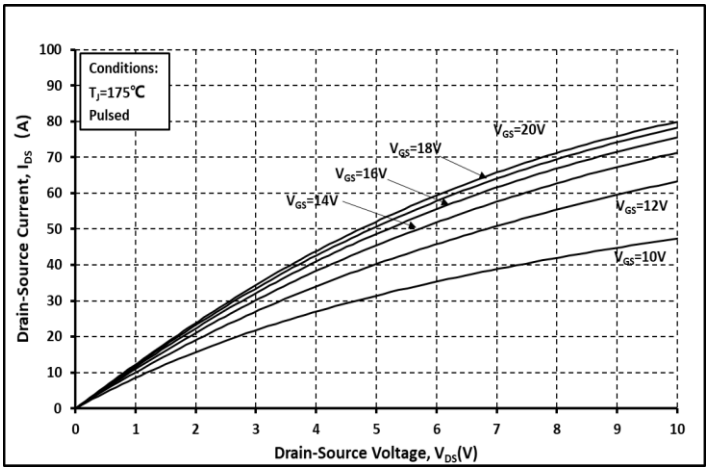


Fig. 3 Output Curve @ T_J=175℃

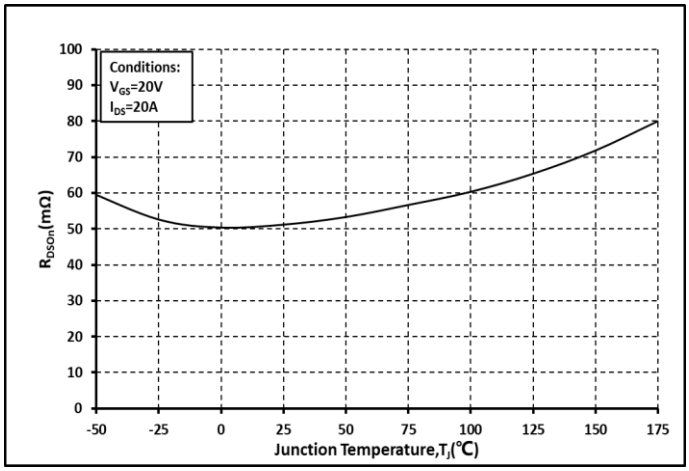


Fig. 4 Ron vs. Temperature

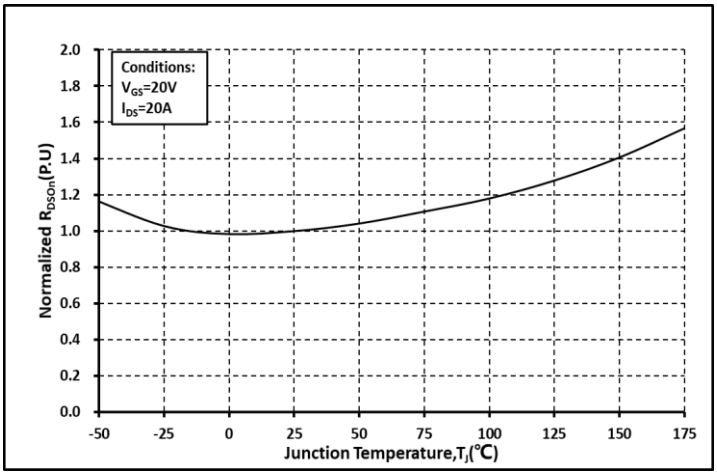


Fig. 5 Normalized Ron vs. Temperature

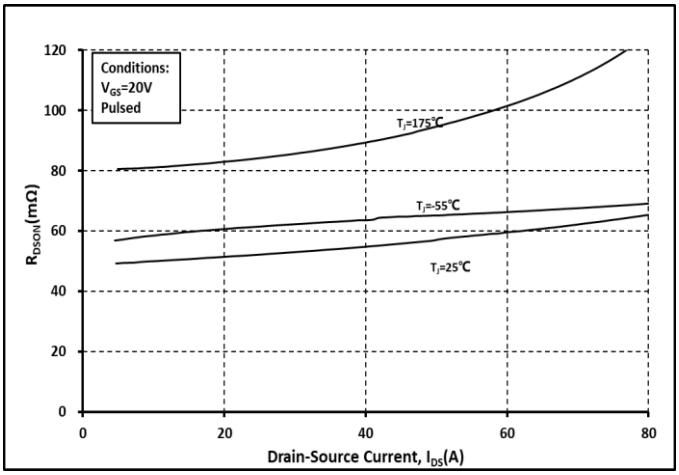


Fig. 6 Ron vs. I_{DS} @ Various Temperature

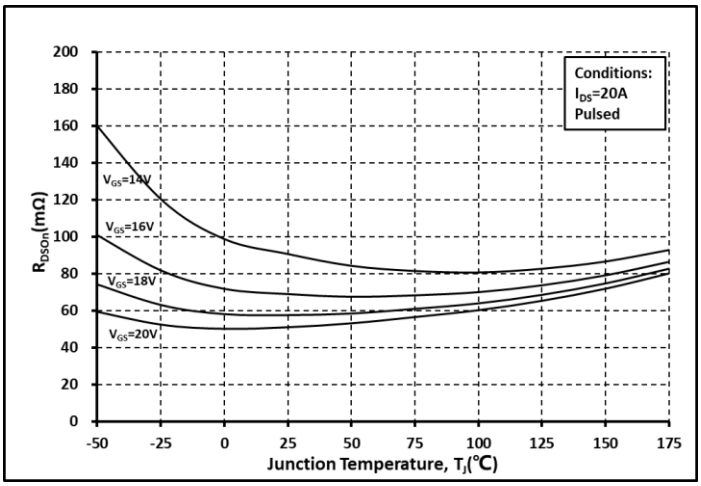


Fig. 7 Ron vs. Temperature @ Various V_{GS}

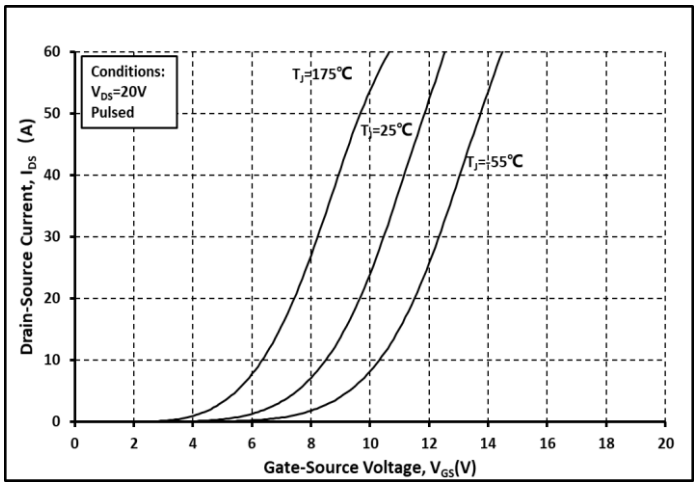


Fig. 8 Transfer Curves @ Various Temperature

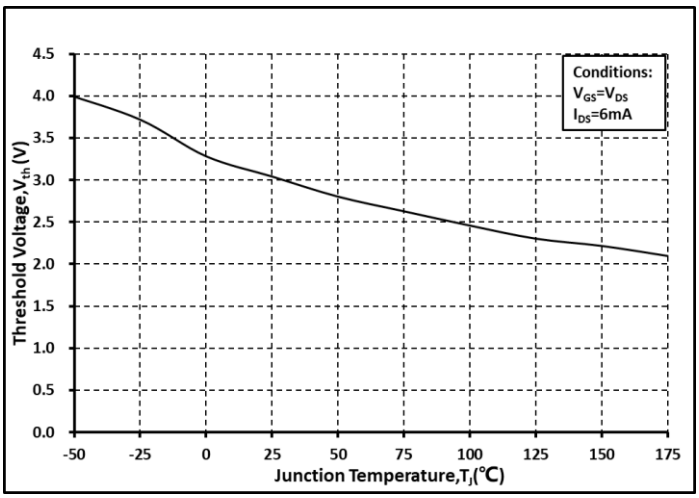


Fig. 9 Threshold Voltage vs. Temperature

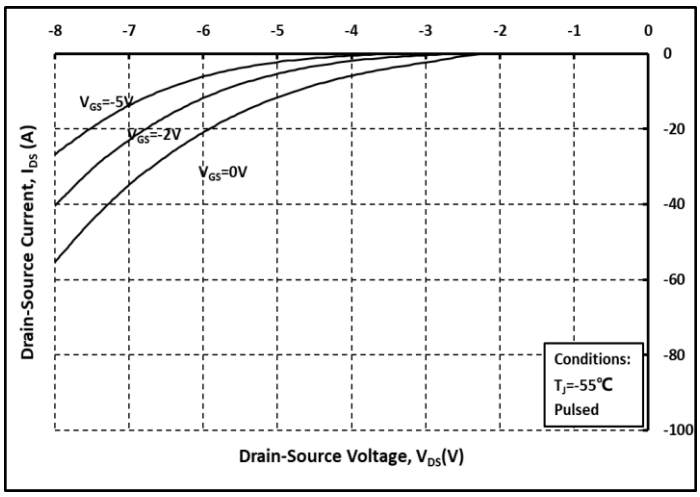


Fig. 10 Body Diode Curves @ T_J=-55°C

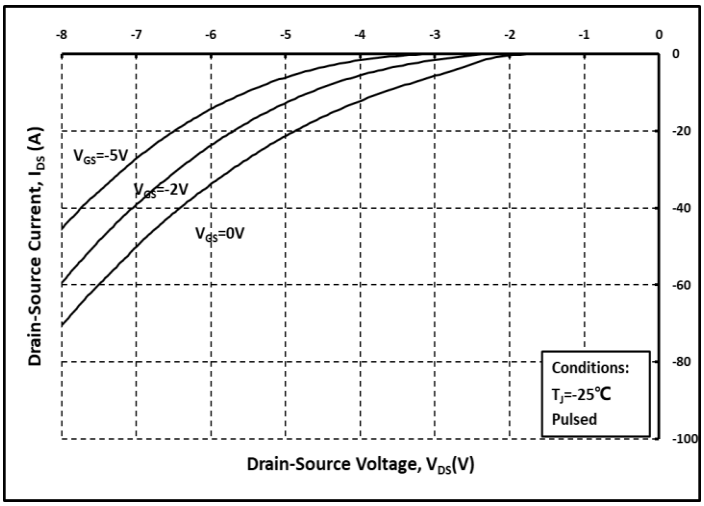


Fig. 11 Body Diode Curves @ T_J=25°C

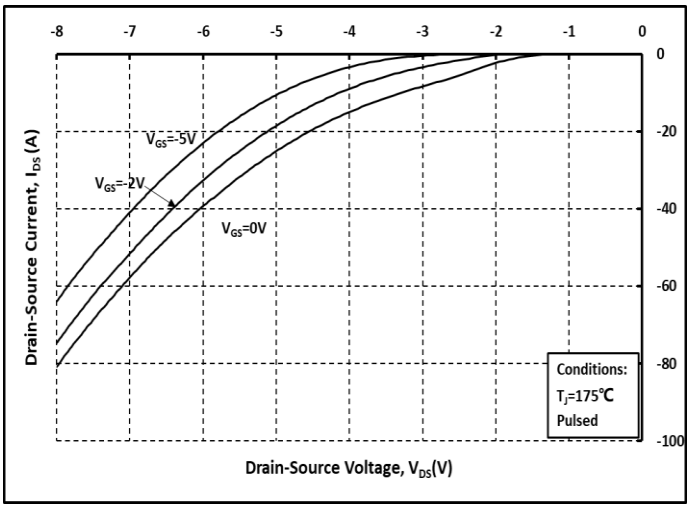


Fig. 12 Body Diode Curves @ T_J=175°C

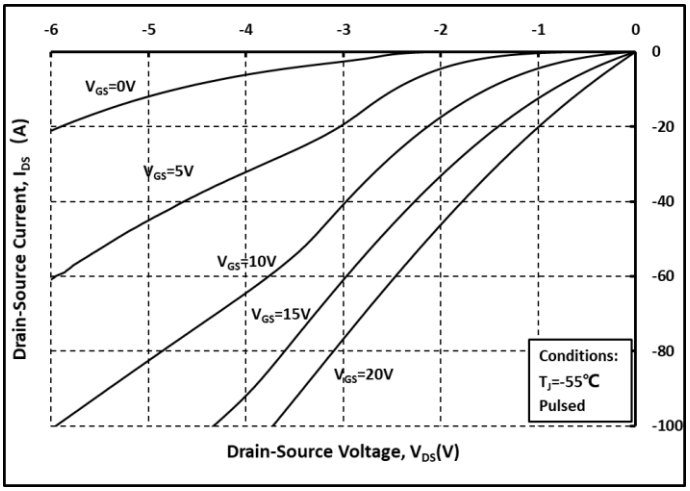


Fig. 13 3rd Quadrant Curves @ T_J=-55°C

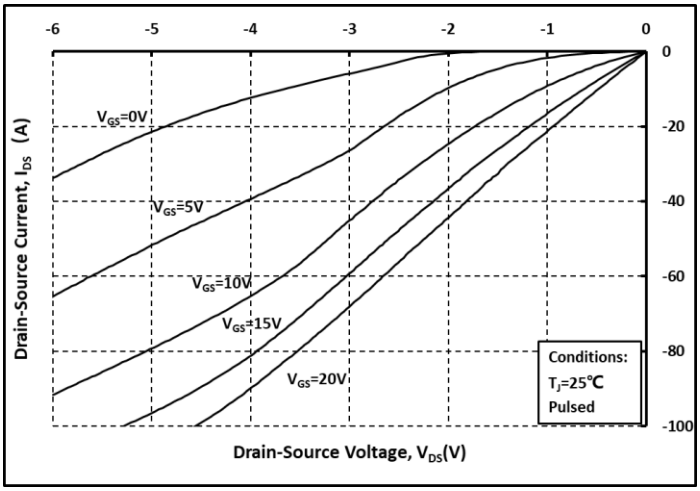


Fig. 14 3rd Quadrant Curves @ T_J=25°C

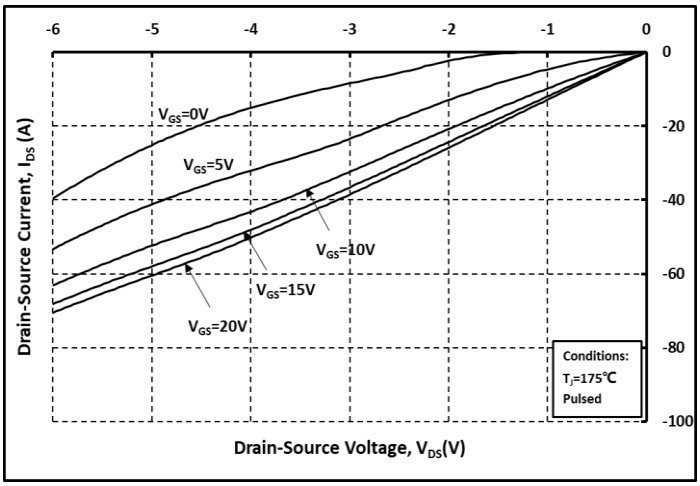


Fig. 15 3rd Quadrant Curves @ T_J=175°C

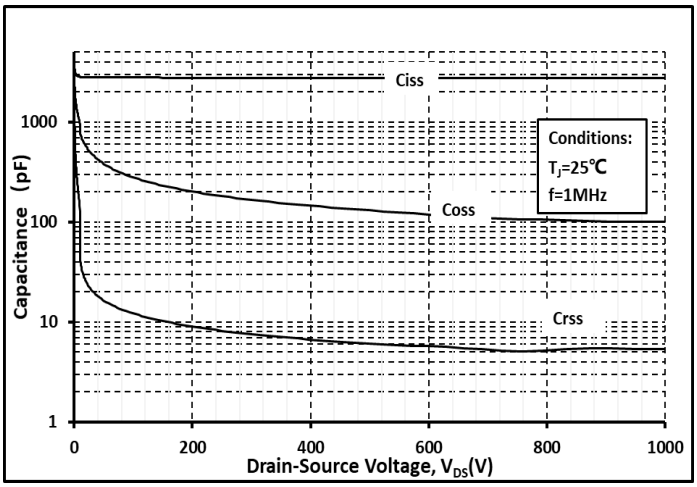


Fig. 16 Capacitance vs. V_{DS}

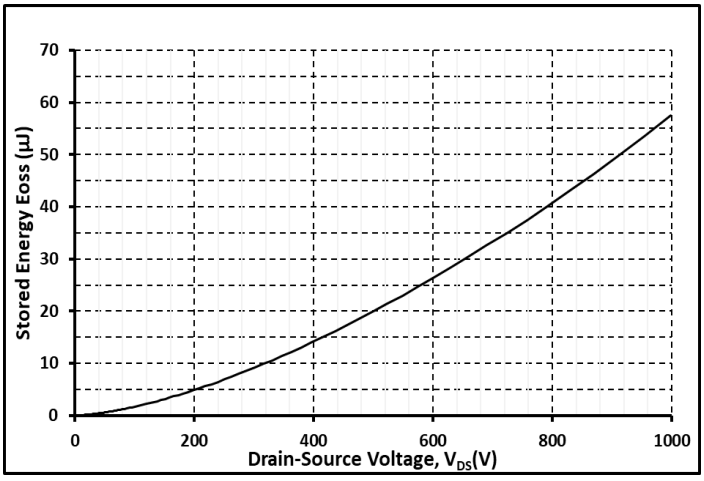


Fig. 17 Output Capacitor Stored Energy

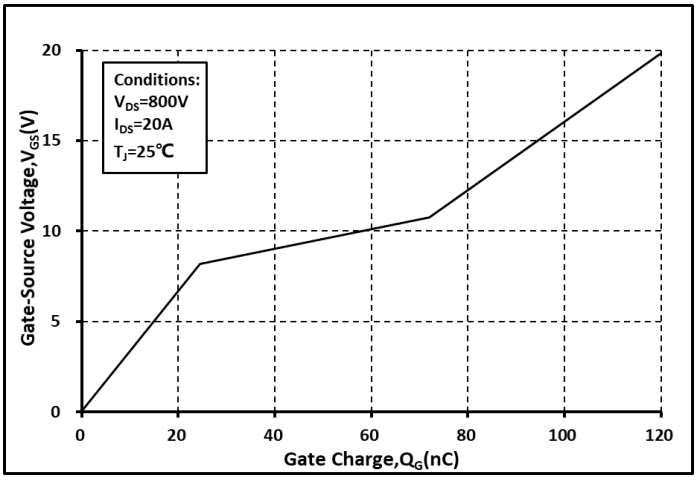


Fig. 18 Gate Charge Characteristics

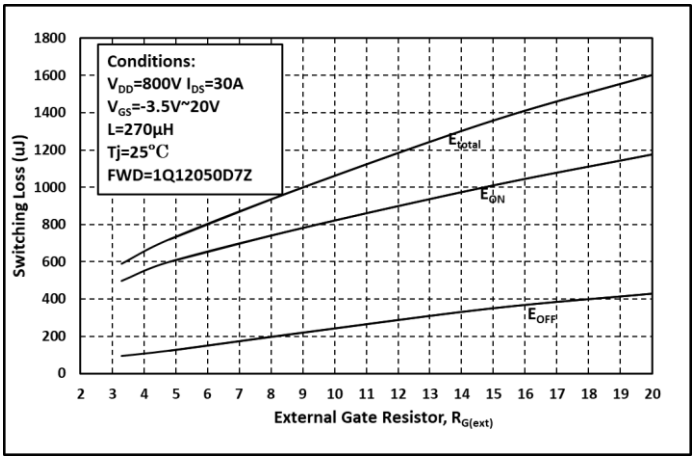


Fig. 19 Switching Energy vs. $R_{G(ext)}$

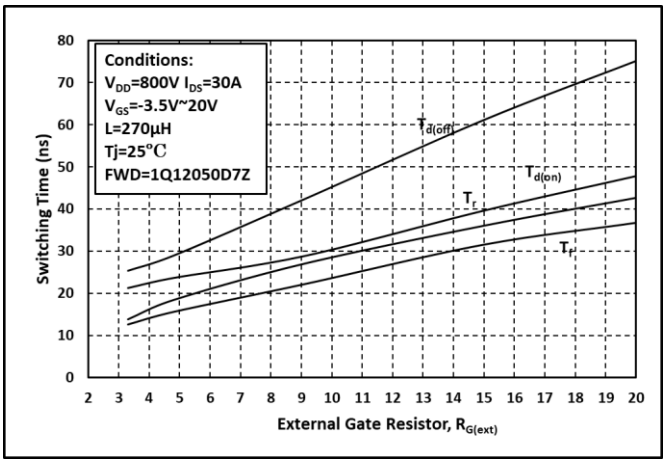


Fig. 20 Switching Times vs. $R_{G(ext)}$

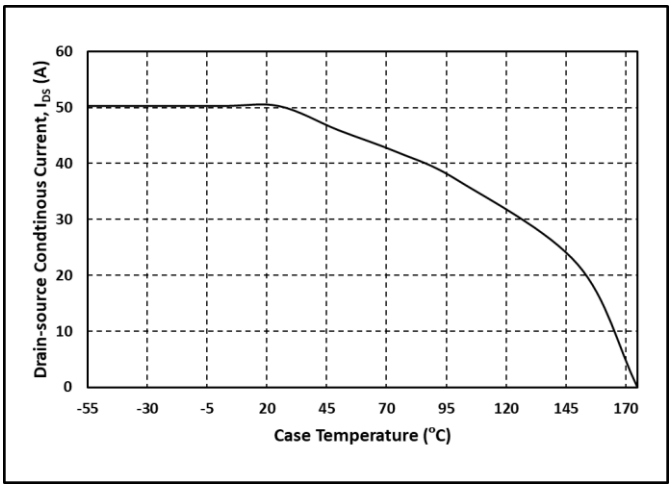


Fig. 21 Continuous Drain Current vs. Case Temperature

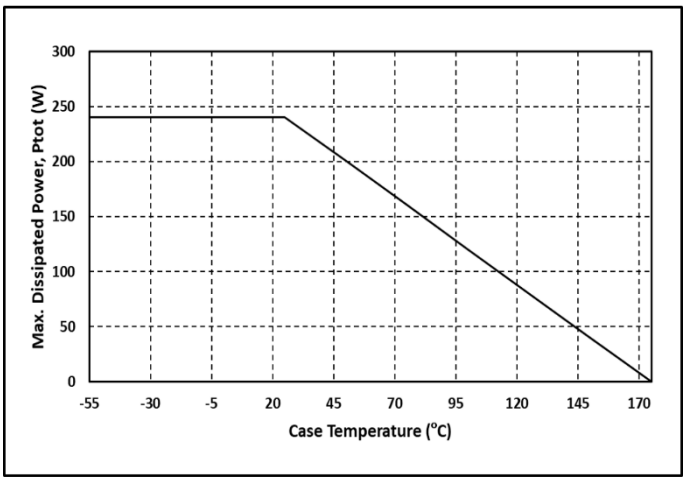


Fig. 22 Max. Power Dissipation Derating vs. Case Temperature

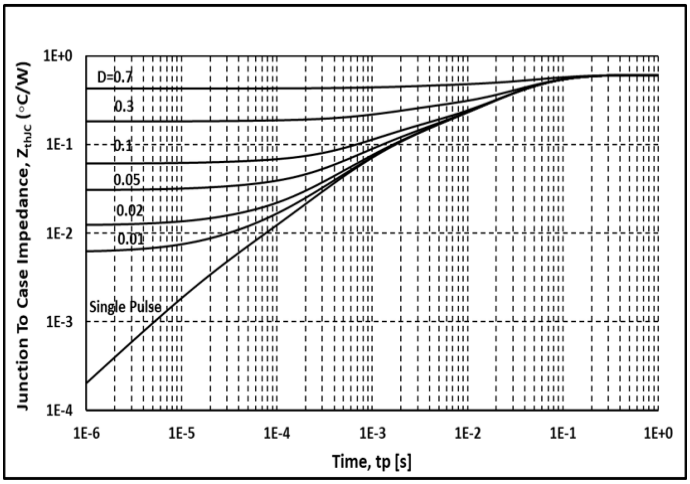


Fig. 23 Thermal Impedance

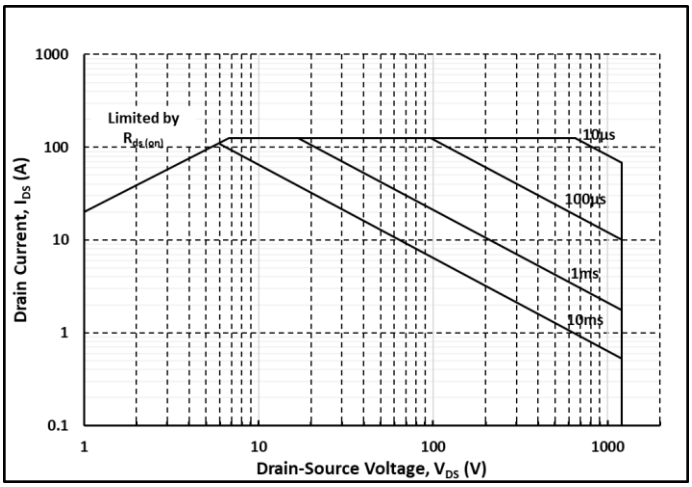
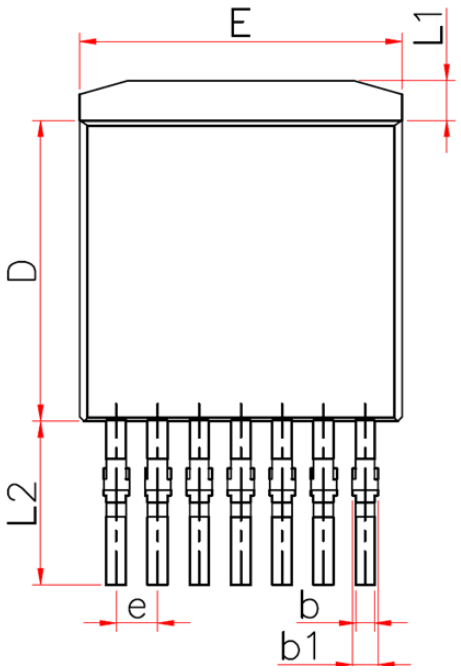
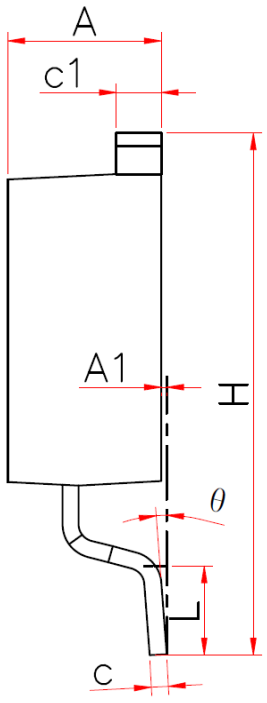


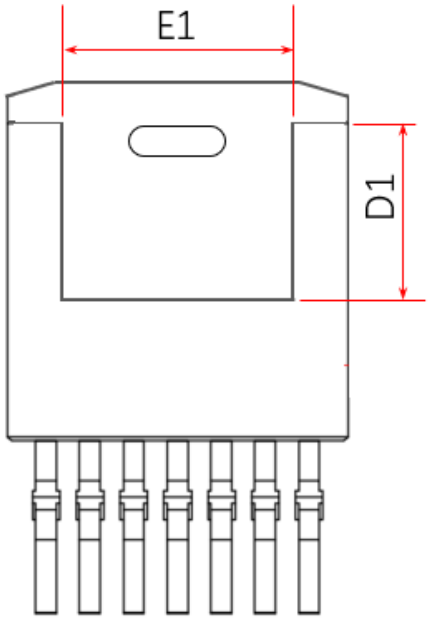
Fig. 24 Safe Operating Area

Package Dimensions





Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.300	4.560
A1	—	0.250
b	0.500	0.700
b1	0.600	0.900
c	0.450	0.600
c1	1.200	1.400
D	8.930	9.230
D1	4.650	4.950
E	10.080	10.280
E1	6.820	7.620
e	1.27 REF.	
H	15.000	16.000
L	1.900	2.500
L1	0.980	1.420
L2	4.350	5.590
θ	0°	7°



Note:

1. Package Reference: JEDEC TO263, Variation AD
2. All Dimensions are in mm
3. Subject to Change Without Notice

Notes

For further information please contact IVCT's office.

The Information in this document is subject to change without notice.

Related Links

http://www.inventchip.com.cn

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for SiC MOSFETs ***category:***

Click to view products by InventChip ***manufacturer:***

Other Similar products are found below :

NTC040N120SC1 HC3M001K170J IMBG65R048M1HXTMA1 IMW120R045M1 SCTWA70N120G2V-4 SCT040HU65G3AG SCTWA90N65G2V GC3M0060065K GC3M0120090D GC3M0032120D GC3M0160120D GC3M0040120K GC3M0021120D GC3M0065090D GC3M0032120K GC3M0065100K GC3M0075120K GC2M0040120D GC3M0280090D GC2M0025120D GC3M0075120D GC3M0040120D GC2M0280120D GC2M0080120K GC3M0016120D GC2M0045170D GC2M0160120K GC3M0021120K SP25N120CTK SP90N120CTK GC3M0080120K SP50N120CTK GC2M0160120D GC2M1000170D GC3M0120100K GC2M0080120D SP50N120CTF SP35N120CTF SP25N120CTF IV2Q171R0D7 IV1Q06040L1 IV1Q06060T3G IV1Q12160T4 IV1B12013HA1L IV1Q12160T3 IV1Q07015T4G IV1Q12750O3 IV1Q06040T3 IV1Q12050T4Z IV1Q12030T4G