IV2Q171R0D7Z – 1700V 1000mΩ SiC MOSFET

Features

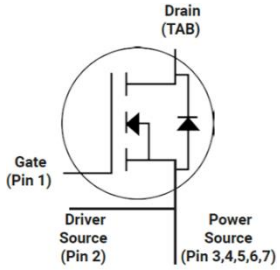
- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode
- AEC-Q101 qualified

Applications

- Solar inverters
- Switch mode power supplies
- Auxiliary power supplies
- Smart meters

Outline:

TO263-7



Marking Diagram:

2Q171R0D7Z
YYWWZ
XXXX

2Q171R0D7Z = 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	1700	V	V_{GS}=0V, I_D=10μA	
V_{GSmax} (DC)	Maximum DC voltage	-5 to 20	V	Static (DC)	
V_{GSmax} (Spike)	Maximum spike voltage	-8 to 22	V	<1% duty cycle, and pulse width<200ns	
V_{GSon}	Recommended turn-on voltage	15 to 18	V		
V_{GSoff}	Recommended turn-off voltage	-3.5 to -2	V		
I_D	Drain current (continuous)	5	A	V_{GS}=18V, T_C=25°C	Fig. 21
		3.7	A	V_{GS}=18V, T_C=100°C	
I_{DM}	Drain current (pulsed)	12	A	Pulse width limited by SOA	Fig. 24
P_{TOT}	Total power dissipation	39	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		
T_L	Solder Temperature	260	°C	wave soldering only allowed at leads, 1.6mm from case for 10 s	

Thermal Data

Symbol	Parameter	Value	Unit	Note
$R_{\theta(J-C)}$	Thermal Resistance from Junction to Case	3.8	°C/W	

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		1	10	μA	V_{DS}=1700V, V_{GS}=0V	
I_{GSS}	Gate leakage current			±100	nA	V_{DS}=0V, V_{GS}=-5~20V	
V_{TH}	Gate threshold voltage	1.8	3.0	5.0	V	V_{GS}=V_{DS}, I_D=380uA	Fig. 8, 9
			2.0		V	V_{GS}=V_{DS}, I_D=380uA @ T_J=175°C	
R_{ON}	Static drain-source on-resistance	520 950	700 1280	850 1540	mΩ	V_{GS}=18V, I_D=1A @T_J=25°C @T_J=175°C	Fig. 4, 5, 6, 7
		700 1050	900 1320	1100 1600	mΩ	V_{GS}=15V, I_D=1A @T_J=25°C @T_J=175°C	
C_{iss}	Input capacitance		285		pF	V_{DS}=1000V, V_{GS}=0V, f=1MHz, V_{AC}=25mV	Fig. 16
C_{oss}	Output capacitance		15.3		pF		
C_{rss}	Reverse transfer capacitance		2.2		pF		
E_{oss}	C_{oss} stored energy		11		μJ		Fig. 17
Q_g	Total gate charge		16.5		nC	V_{DS}=1000V, I_D=1A, V_{GS}=-5 to 18V	Fig. 18
Q_{gs}	Gate-source charge		2.7		nC		
Q_{gd}	Gate-drain charge		12.5		nC		
R_g	Gate input resistance		13		Ω	f=1MHz	
E_{ON}	Turn-on switching energy		44.5		μJ	V_{DS}=1000V, I_D=2A, V_{GS}=-3.5V to 18V, $R_{G(ext)}$=22Ω, L=300μH	
E_{OFF}	Turn-off switching energy		16.8		μJ		
$t_{d(on)}$	Turn-on delay time		7.1		ns		
t_r	Rise time		14.1				
$t_{d(off)}$	Turn-off delay time		16.8				
t_f	Fall time		54.4				

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		3.7		V	I_{SD}=1A, V_{GS}=0V	Fig. 10, 11, 12
			3.5		V	I_{SD}=1A, V_{GS}=0V, T_J=175°C	

Typical Performance (curves)

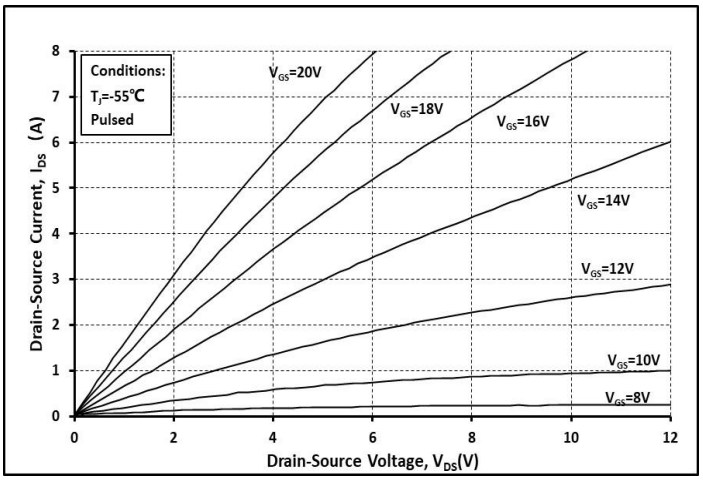


Fig. 1 Output Curve @ T_J=-55℃

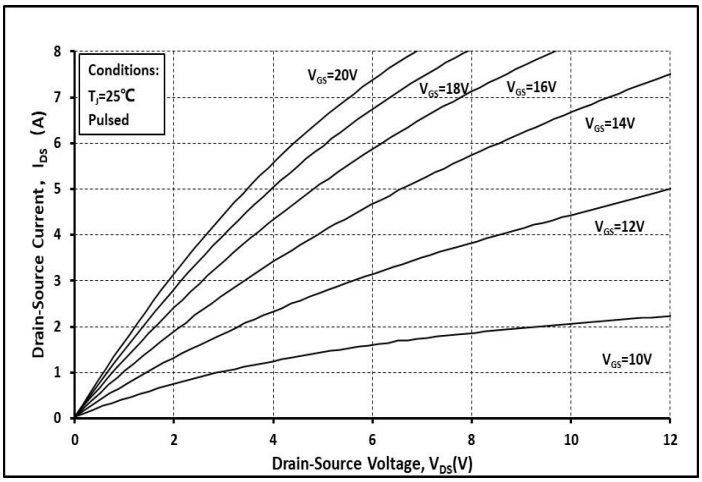


Fig. 2 Output Curve @ T_J=25℃

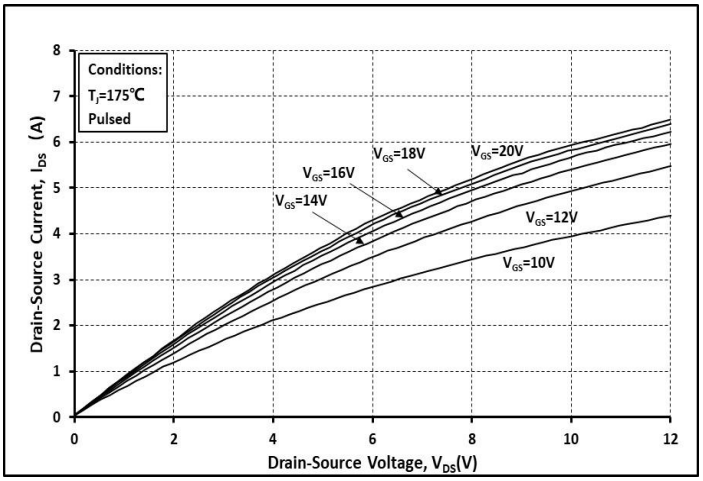


Fig. 3 Output Curve @ T_J=175°C

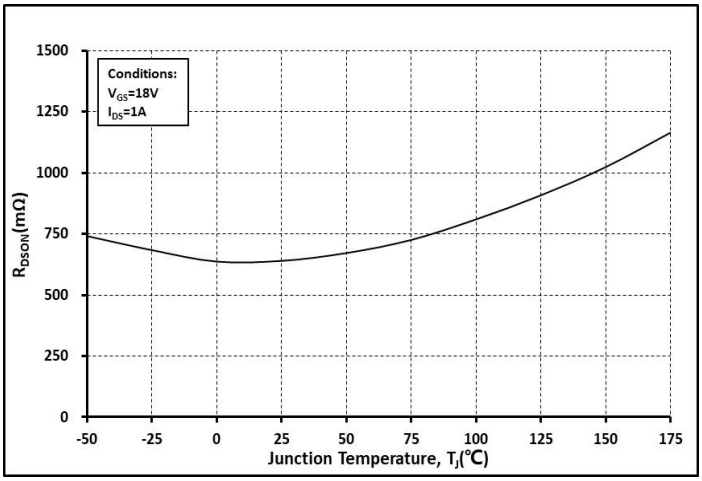


Fig. 4 Ron vs. Temperature

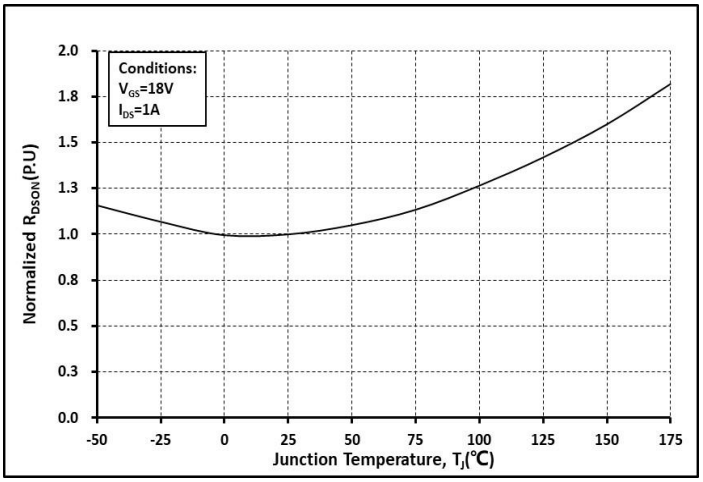


Fig. 5 Normalized Ron vs. Temperature

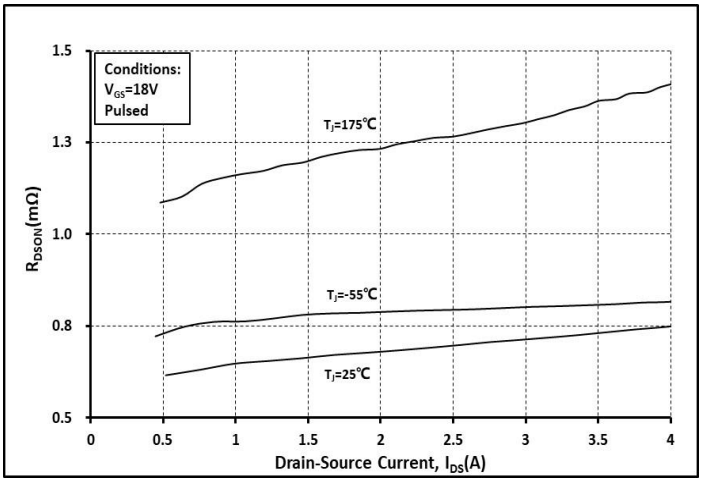


Fig. 6 Ron vs. I_{DS} @ Various Temperature

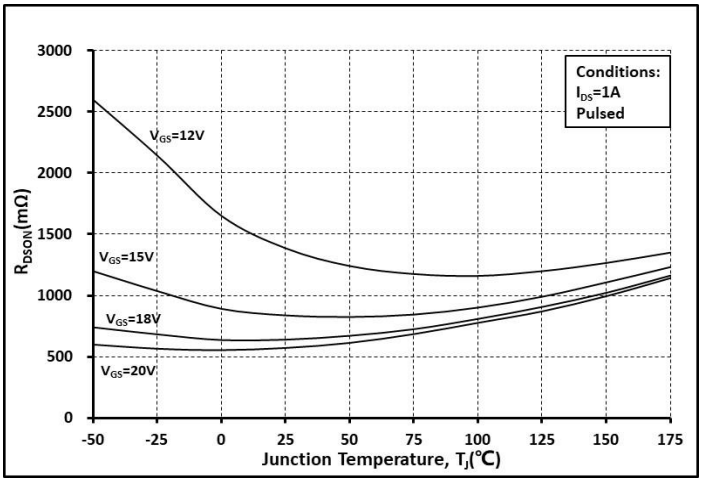


Fig. 7 Ron vs. Temperature @ Various V_{GS}

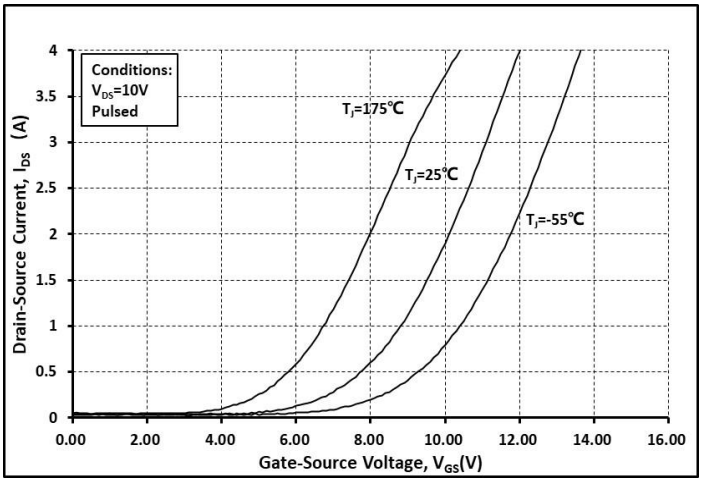


Fig. 8 Transfer Curves @ Various Temperature

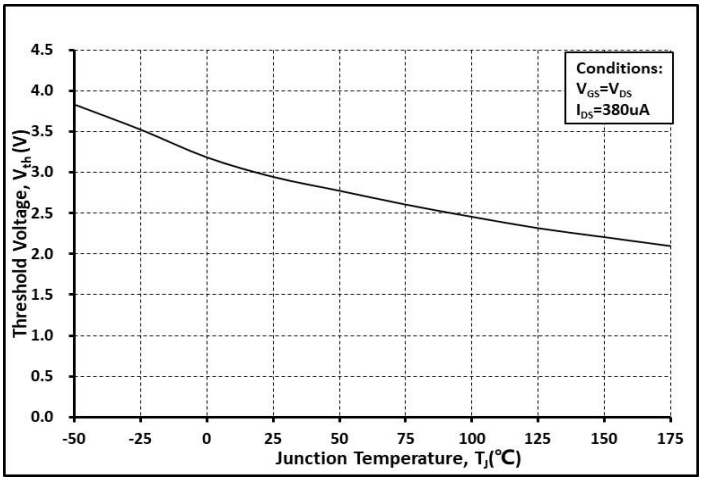


Fig. 9 Threshold Voltage vs. Temperature

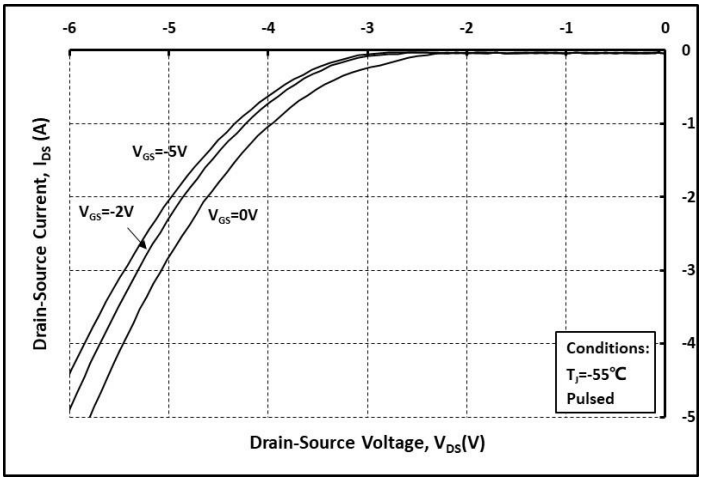


Fig. 10 Body Diode Curves @ T_J=-55°C

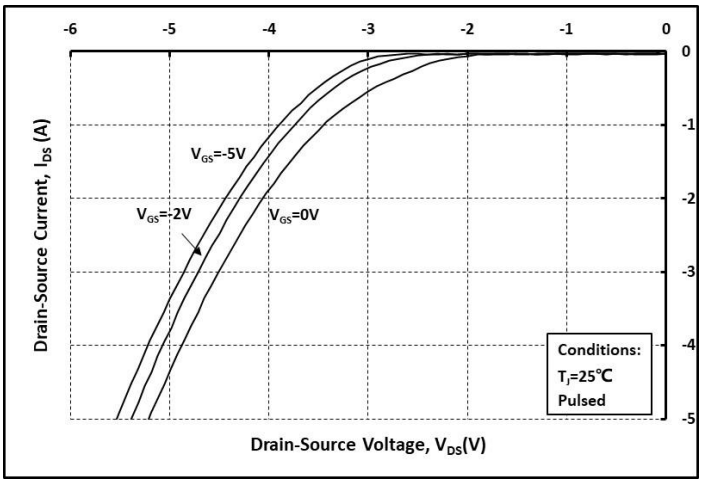


Fig. 11 Body Diode Curves @ T_J=25°C

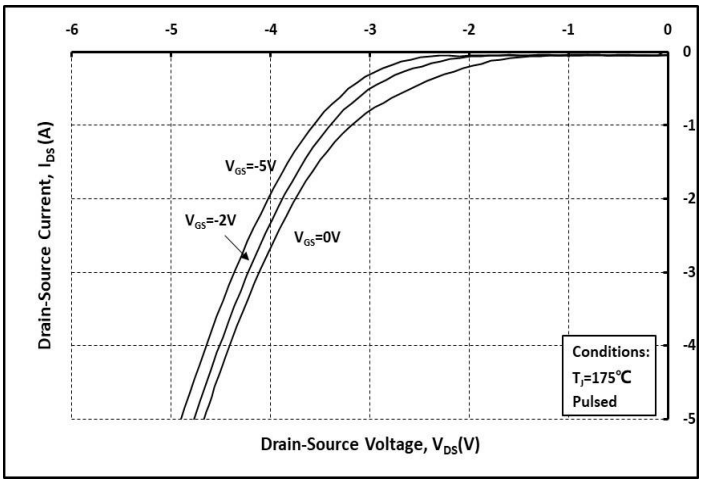


Fig. 12 Body Diode Curves @ T_J=175°C

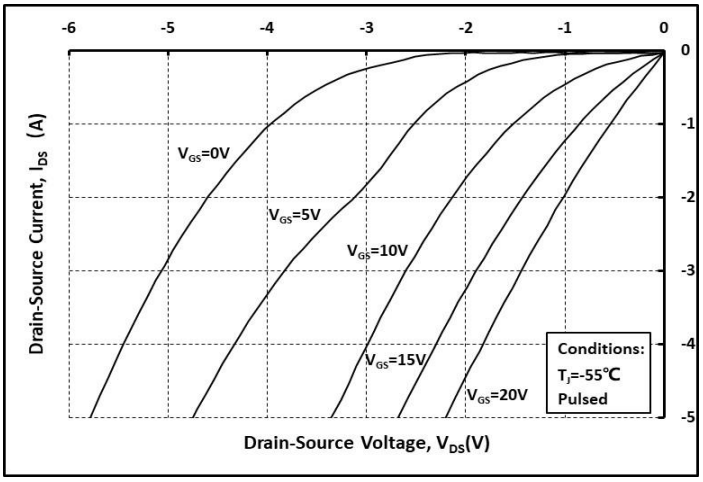


Fig. 13 3rd Quadrant Curves @ T_J=-55°C

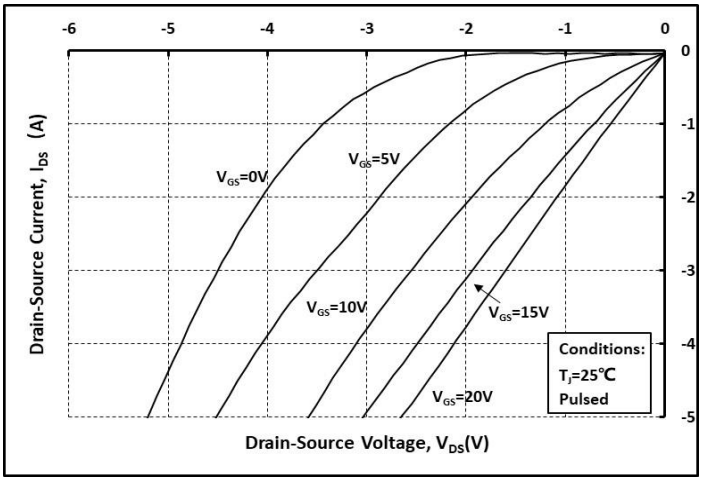


Fig. 14 3rd Quadrant Curves @ T_J=25°C

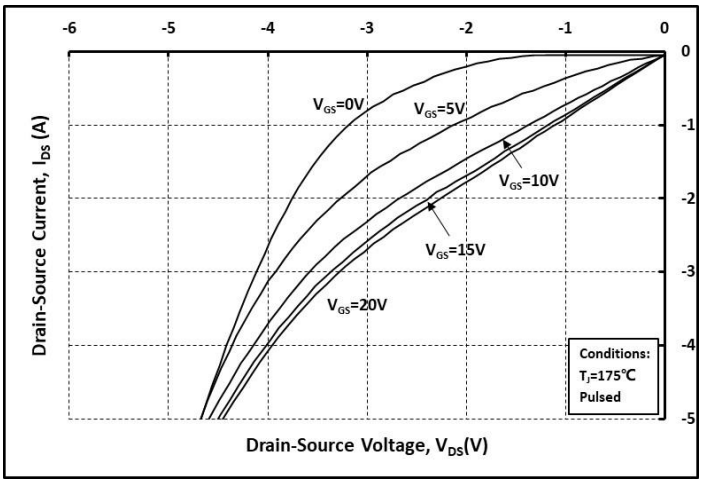


Fig. 15 3rd Quadrant Curves @ T_J=175°C

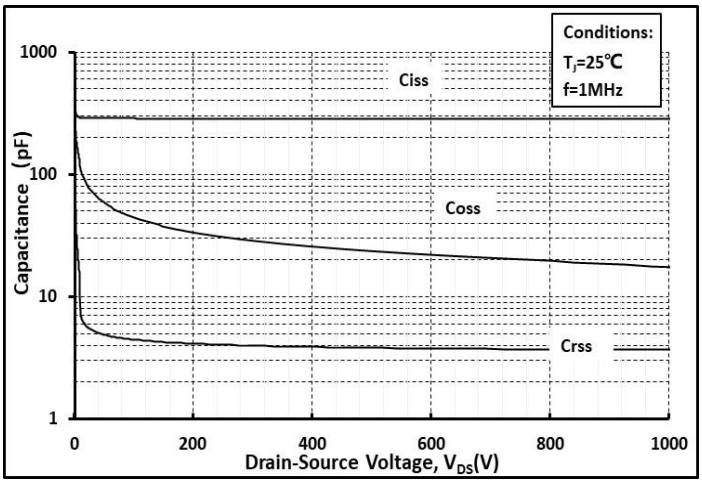


Fig. 16 Capacitance vs. V_{DS}

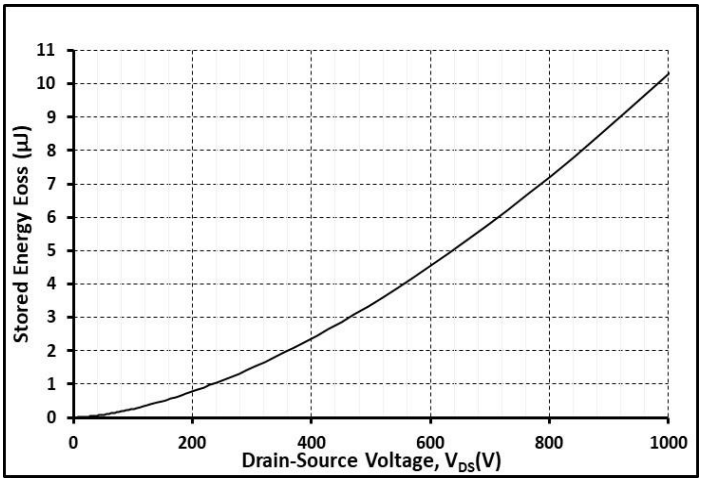


Fig. 17 Output Capacitor Stored Energy

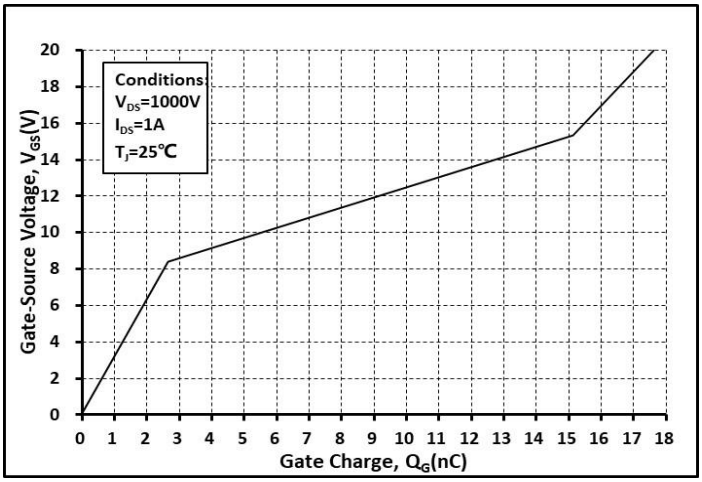


Fig. 18 Gate Charge Characteristics

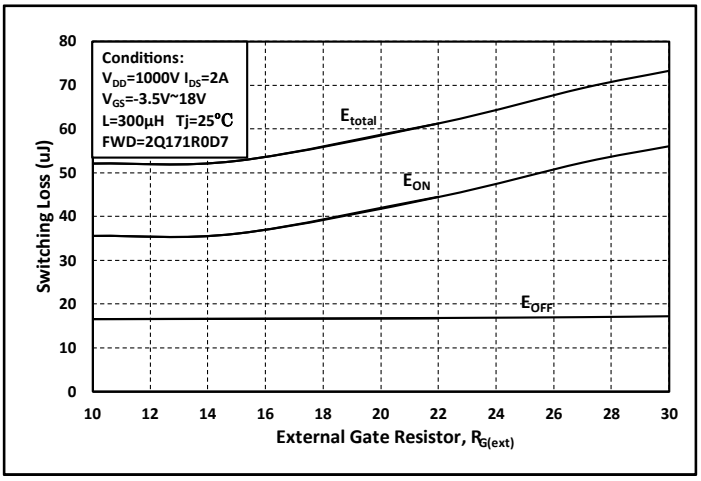


Fig. 19 Switching Energy vs. $R_{G(ext)}$

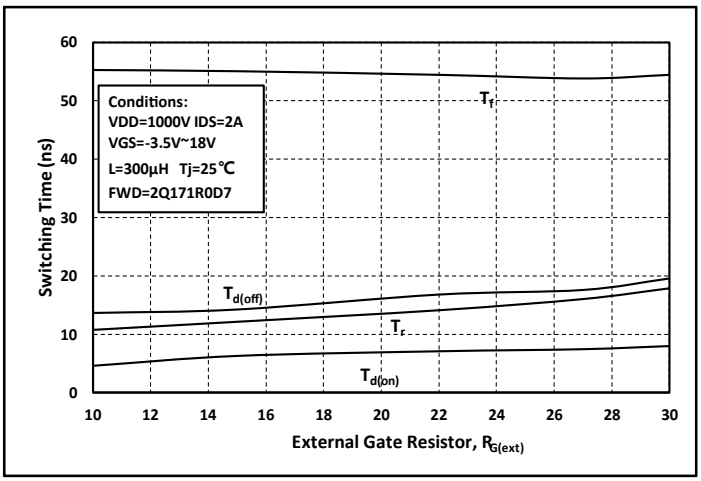


Fig. 20 Switching Times vs. $R_{G(ext)}$

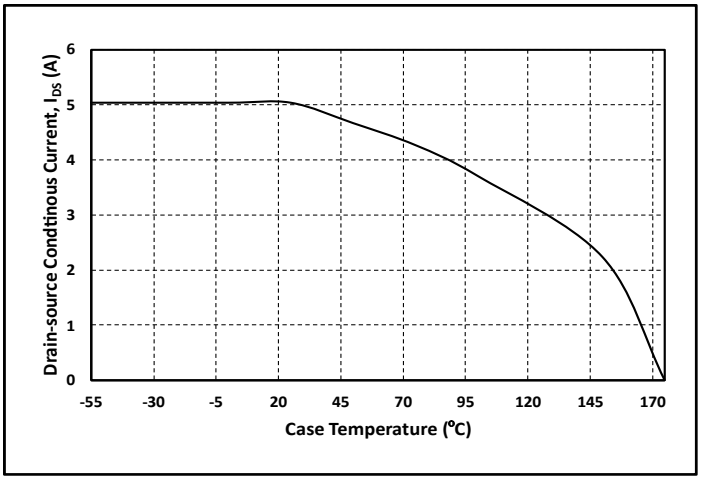


Fig. 21 Continuous Drain Current vs. Case Temperature

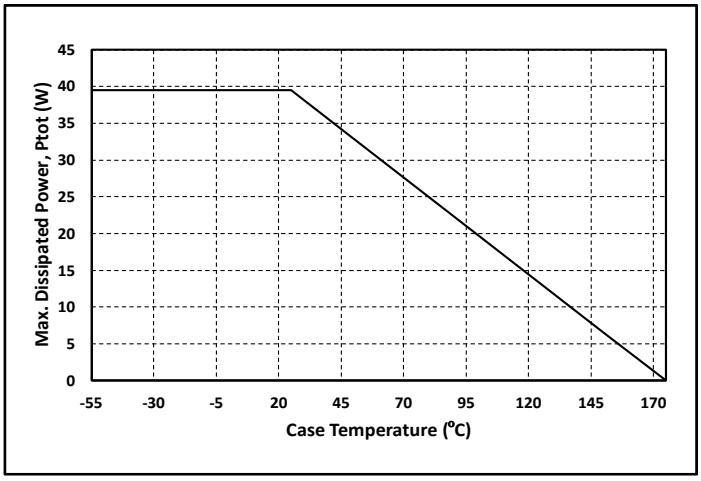


Fig. 22 Max. Power Dissipation Derating vs. Case Temperature

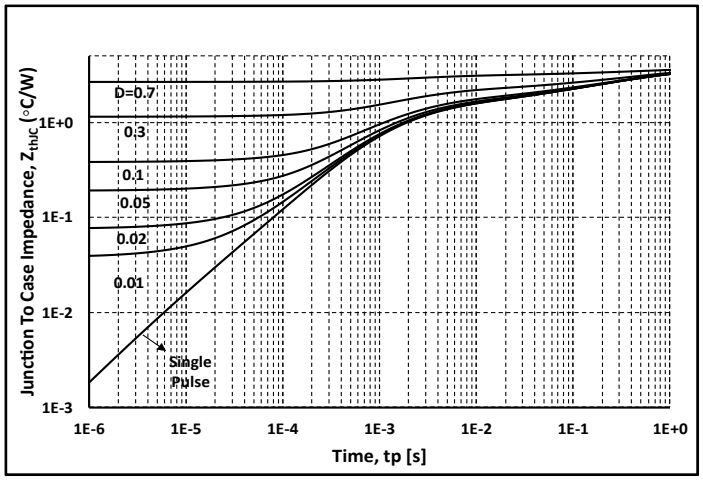


Fig. 23 Thermal Impedance

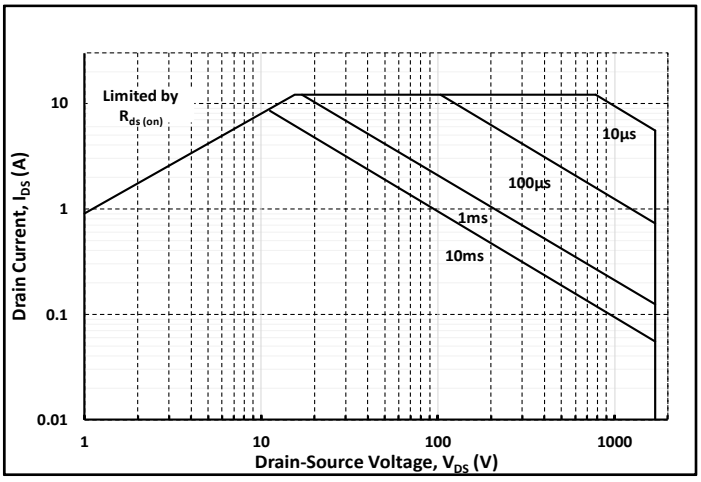
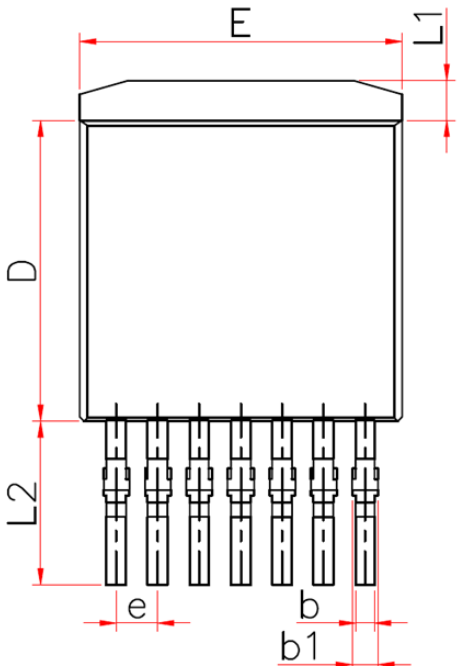
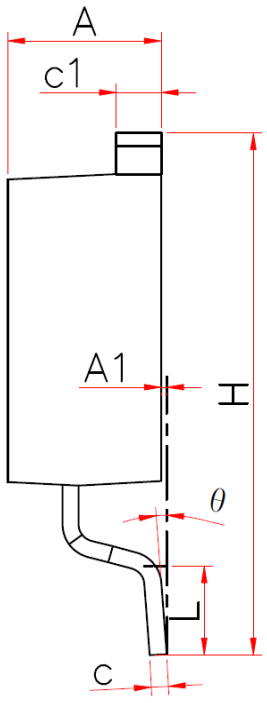


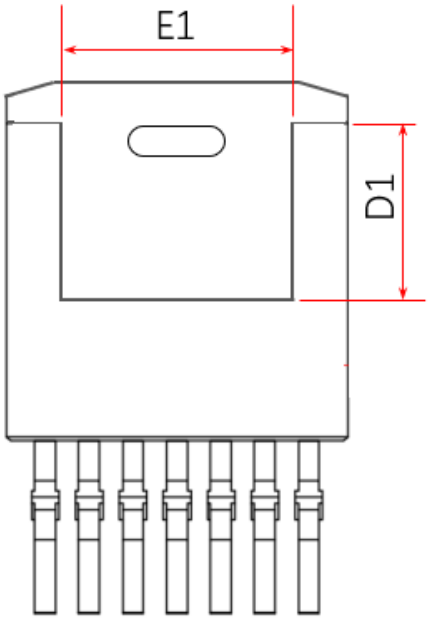
Fig. 24 Safe Operating Area

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	5.890
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

Revision History

Version	Changes	Date
V0.5	Preliminary evaluation data	Otc. 10 2022
V1.0	Update thermal resistance data and switching characterization data	Nov. 17 2022