DACO SEMICONDUCTOR

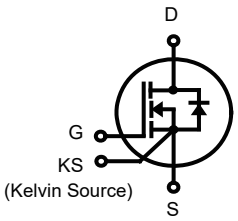
DACMI060N120BZK

Silicon Carbide Enhancement Mode MOSFET

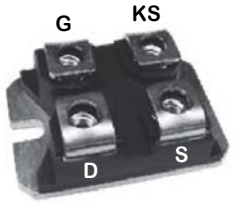
Preliminary

Features

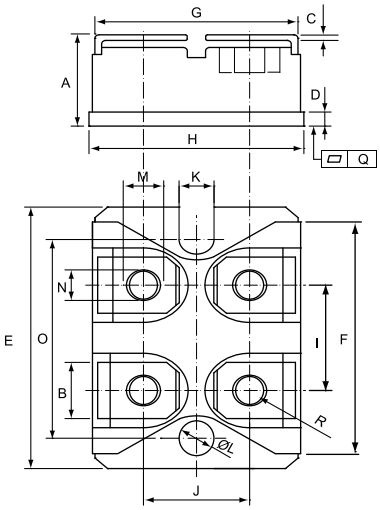
- V_{DSS} = 1200V
- $R_{DS(ON)}$ Tpy. 40 mΩ@ V_{GS} = 20 V
- Fully Avalanche Rated
- Pb Free & RoHS Compliant
- Isolation Type Package
- Electrically Isolation base plate



SOT-227



Dimensions in inches and (millimeters)



Applications

- Solar Inverters
- Switch Mode Power Supplies
- Power Converters
- Battery Chargers
- Motor Drive

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

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage Static, recommended DC operating values		V_{GS}	-5/+20	V
Drain Current-Continuous	@ T_C =25°C @ T_C =110°C	I_D	60 42	A
Drain Current-Pulsed	@ T_C =25°C	I_{DM}	223	A
Power Dissipation		P_D	326	W
Storage Temperature Range		T_{STG}	-55 to +175	°C
Operating Junction Temperature Range		T_{VJ}	-55 to +175	°C
Thermal Resistance, Junction-to-Case		$R\theta_{JC}$	0.46	°C/W
Isolation Voltage (A.C. 1 minute) between All Terminals and Baseplate		V_{iso}	2500	V
Mounting torque (M4 Screw)	To heatsink To terminals	M_d	1.3 1.1	N m
Avalanche energy, single pulse	I_D = 12A V_{DD}=100V	E_{AS}	1875	mJ

DIMENSIONS				
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.460	0.483	11.68	12.28
B	0.307	0.323	7.80	8.20
C	0.030	0.033	0.75	0.85
D	0.071	0.081	1.80	2.05
E	1.488	1.504	37.80	38.20
F	1.248	1.260	31.70	32.00
G	0.917	0.957	23.30	24.30
H	0.996	1.008	25.30	25.60
I	0.579	0.602	14.70	15.30
J	0.492	0.516	12.50	13.10
K	0.161	0.169	4.10	4.30
L	0.161	0.169	4.10	4.30
M	0.181	0.197	4.60	5.00
N	0.165	0.181	4.20	4.60
O	1.181	1.197	30.00	30.40
Q	-0.002	0.004	-0.05	0.10
R	M4*8			

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V I_{DS} =0.1mA	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} =0V V_{DS} =1200V	-	<1	50	μA
Gate-Body Leakage	I_{GSS}	V_{GS} =20V V_{DS} =0V	-	-	250	nA
ON Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =10V，I_{DS} =40mA	1.5	2.7	-	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} =20V，I_{DS} =30A	-	40	52	mΩ
Internal Gate Resistance	$R_{G(int.)}$		-	0.9	-	Ω
Forward Transconductance	g_{fs}	V_{DS} =15V，I_{DS}=30A	-	15	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} =800V V_{GS} =0V V_{AC} =25mV Freq.=1MHz	-	3619	-	pF
Output Capacitance	C_{oss}		-	145	-	
Reverse Transfer Capacitance	C_{rss}		-	18	-	
Total Gate Charge	Q_g	V_{DS} =800V V_{GS} =-5/+20V I_D =30A	-	229	-	nC
Gate to Source Charge	Q_{gs}		-	68	-	
Gate to Drain Charge	Q_{gd}		-	66	-	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{DS} = 800V V_{GS} = -4/+20V I_D = 30A R_L=27Ω $R_{G(ext)}$ = 2.7Ω	-	26	-	ns
Rise Time	t_r		-	50	-	
Turn-Off Delay Time	$t_{d(off)}$		-	7	-	
Fall Time	t_f		-	11	-	
Coss Stored Energy	E_{oss}	V_{GS} =0V , V_{DS} =800V f=1MHz , V_{AC} =25mV	-	59	-	μJ
Turn-On Switching Energy	E_{on}	V_{DS} = 800V V_{GS} = 0V/+20V I_D = 30A $R_{G(ext)}$ = 2.7Ω	-	83*	-	
Turn-Off Switching Energy	E_{off}		-	128*	-	
Built-in SiC Diode Characteristics						
Inverse Diode Forward Voltage	V_{Ds}	V_{GS} =0V，I_{SD} =7.5A	-	2.9	-	V
Continuous Diode Forward Current	I_S	V_{GS} =0V，Tc =25℃	-	48	-	A
Reverse Recovery Charge	Q_{rr}	V_{GS} = 0V I_{SD} = 30A，V_{DS} = 400V di/dt = 300A/μs	-	212	-	nC
Reverse Recovery Time	T_{rr}		-	59	-	ns
Peak Reverse Recovery Current	I_{rrm}		-	5.1	-	A

Notes:

*** Based on the results of calculation, note that the energy loss caused by the reverse recovery of free-wheeling diode is not included in Eon.**

Typical Device Performance

Figure 1. Forward Output Characteristics at T_J=25°C

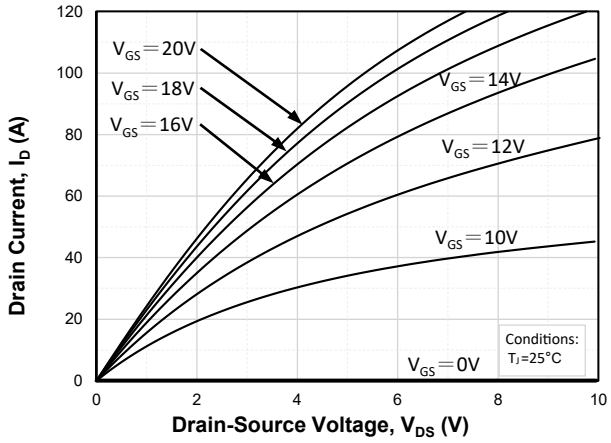


Figure 2. Forward Output Characteristics at T_J=175°C

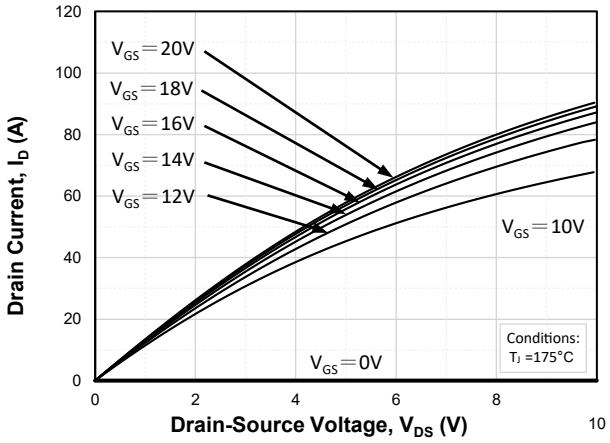


Figure 3. On-Resistance vs. Drain Current for Various T_J

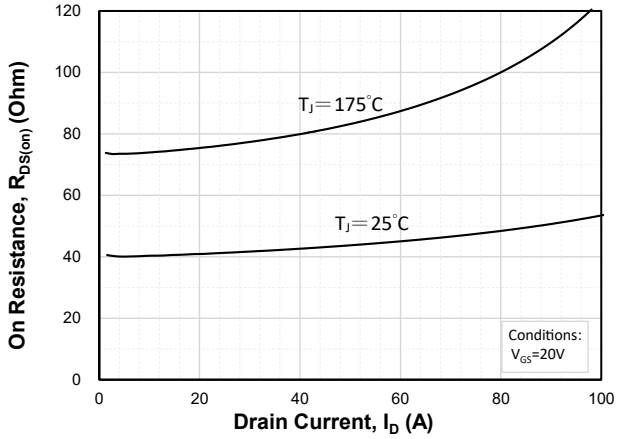


Figure 4. Transfer Characteristics for Various T_J

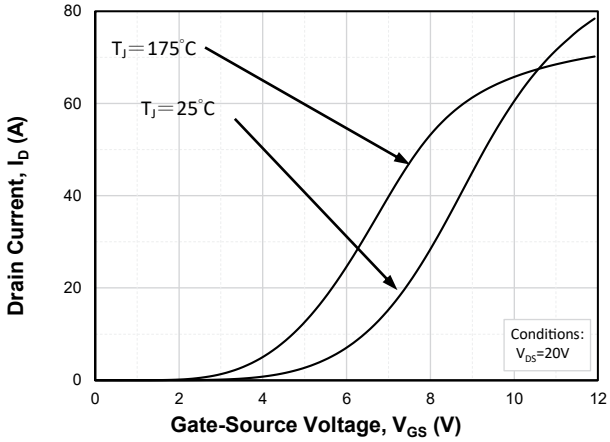


Figure 5. On-Resistance vs. Gate Voltage for Various T_J

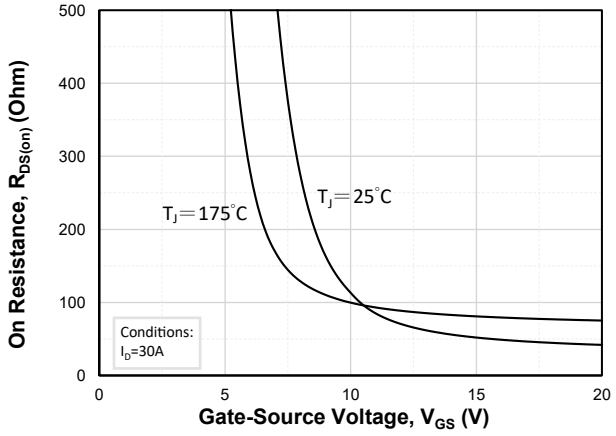
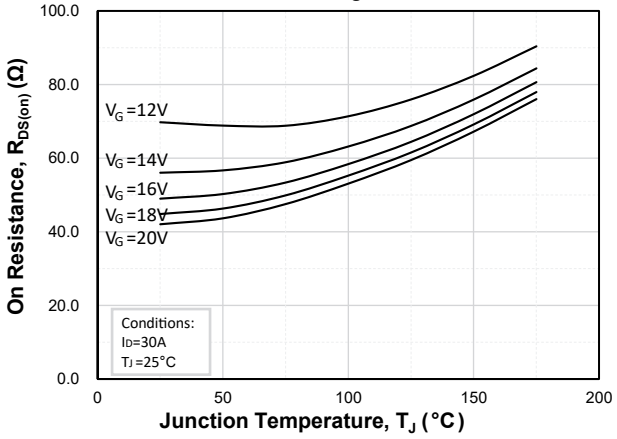


Figure 6. On-Resistance vs. Temperature for Various Gate Voltage



Typical Device Performance

Figure 7. Normalized On-Resistance vs. Temperature

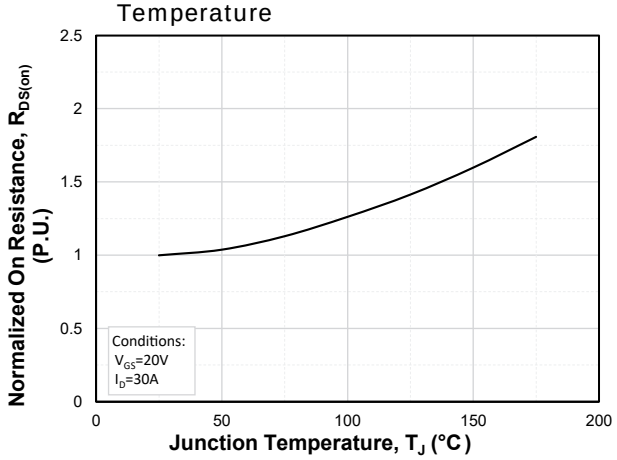


Figure 8. Reverse Output Characteristics at T_J=25°C

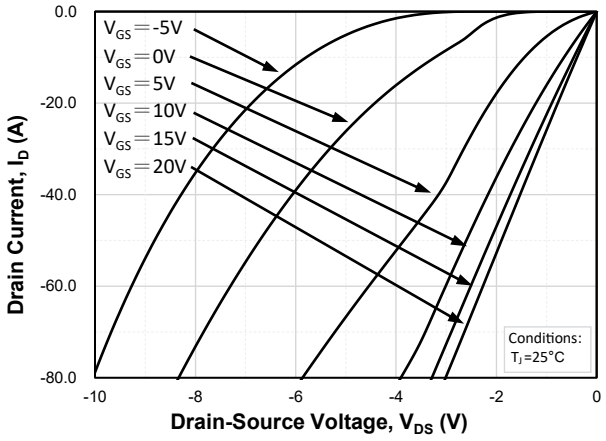


Figure 9. Reverse Output Characteristics at T_J =175°C

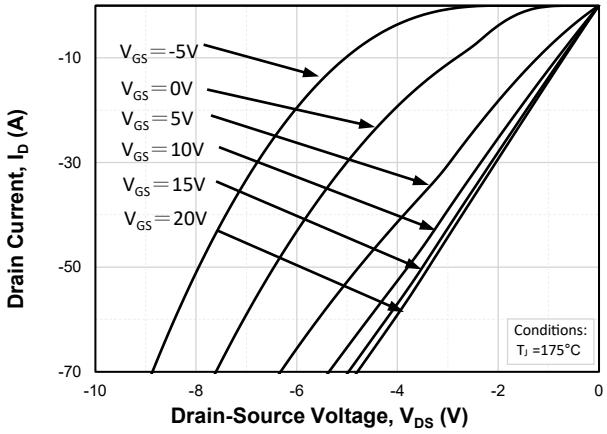


Figure 10. Capacitances vs. Drain to Source Voltage

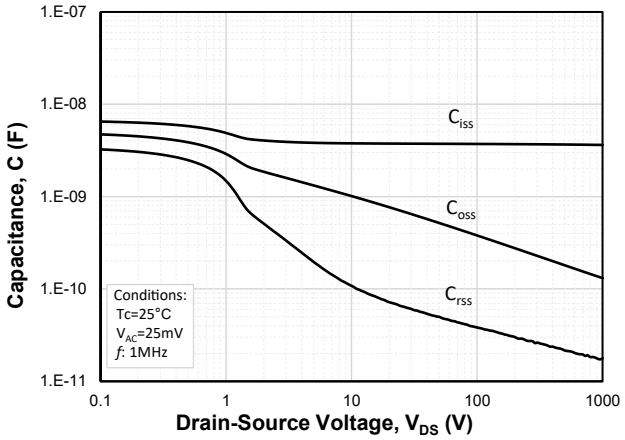


Figure 11. Threshold Voltage vs. Temperature

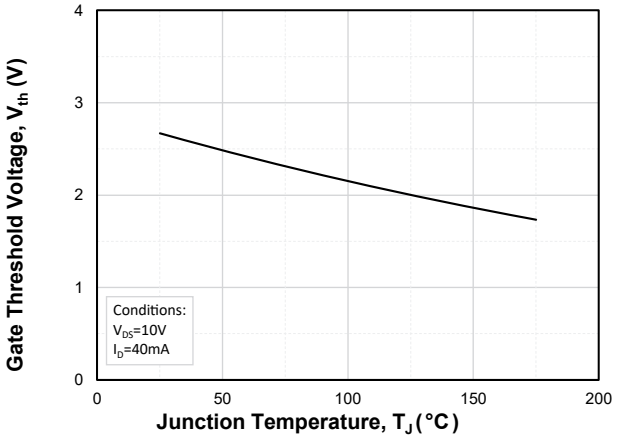
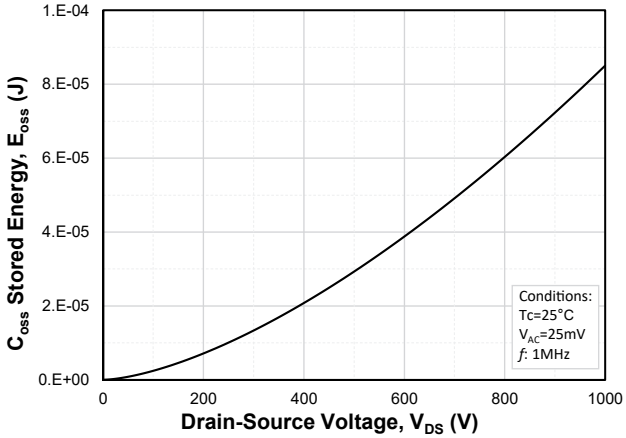


Figure 12. Output Capacitor Stored Energy



Typical Device Performance

Figure 13. Maximum Power Dissipation Derating vs. Case Temperature

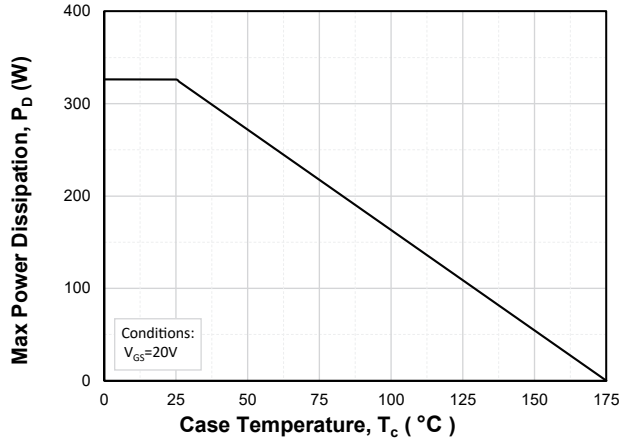


Figure 14. Drain Current Derating vs. Case Temperature

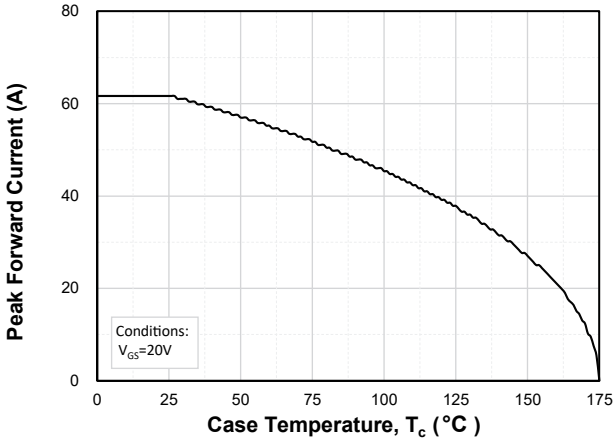


Figure 15. Safe Operating Area

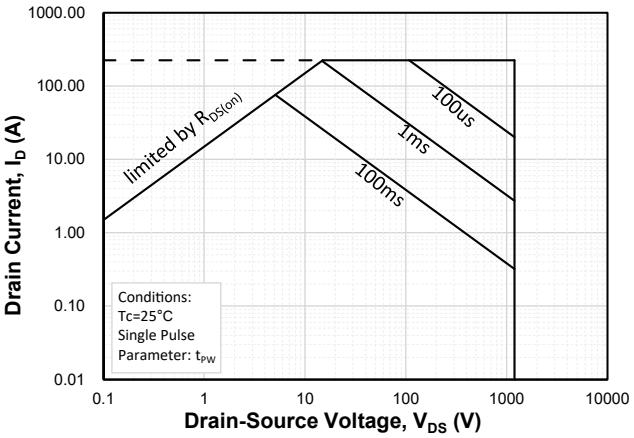


Figure 16. Gate Charge Characteristics

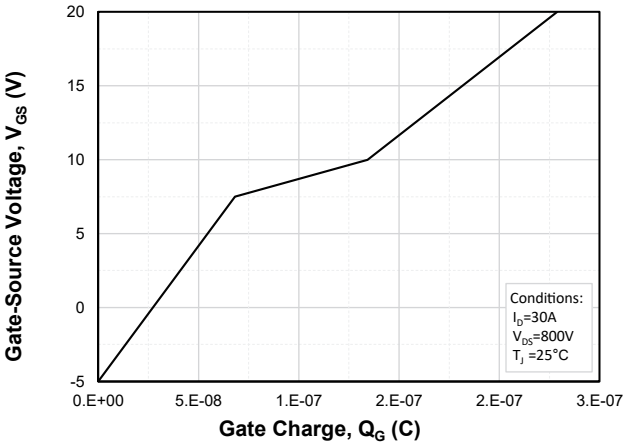


Figure 17. Clamped Inductive Switching Energy vs. Drain Current

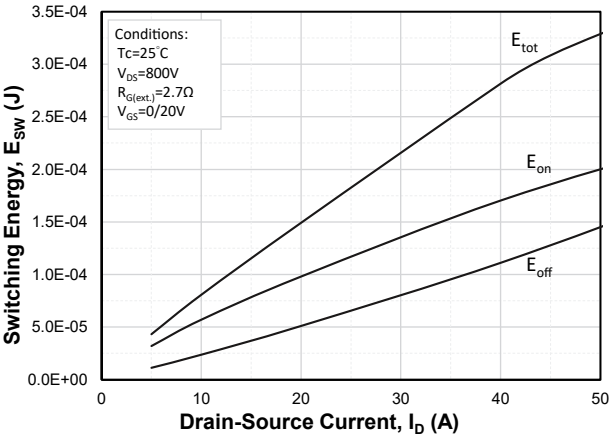
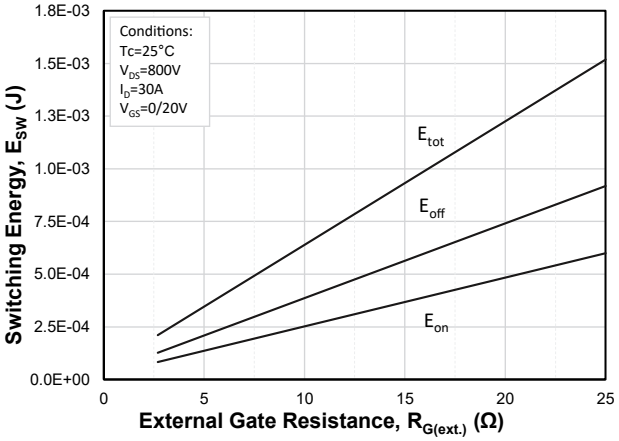


Figure 18. Clamped Inductive Switching Energy vs. External Gate Resistor (RG(ext.))



Typical Device Performance

Figure 19. Schematic of Resistive Switching

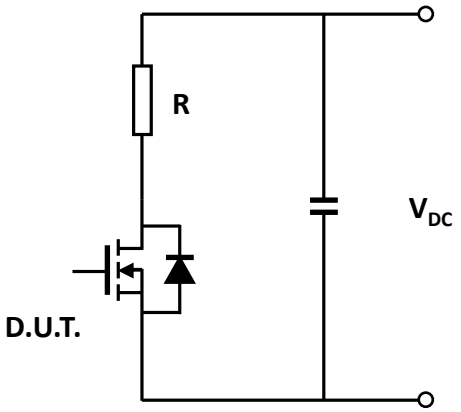


Figure 20. Switching Times Definition

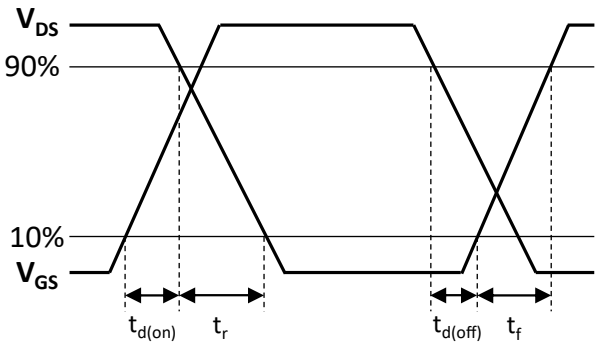
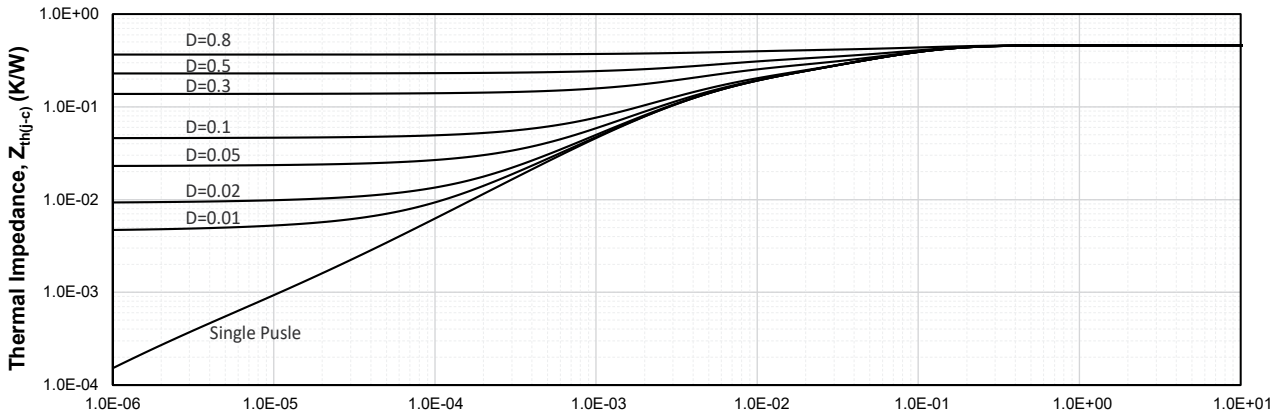


Figure 21. Transient Junction to Case Thermal Impedance



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