

CMS120N080WK

SiC N-Channel 1200-V (D-S) MOSFET

Features

- High speed switching
- High blocking voltage
- Fast reverse recovery

Benefits

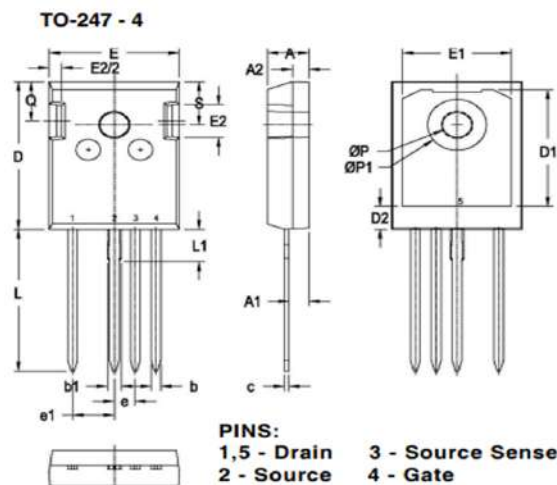
- Low capacitance
- High system efficiency
- Easy to parallel Applications

Typical Applications

- Solar inverters
- Switch mode power supplies, UPS
- Induction heating and welding
- EV charging stations
- High voltage DC/DC converters
- Motor drive

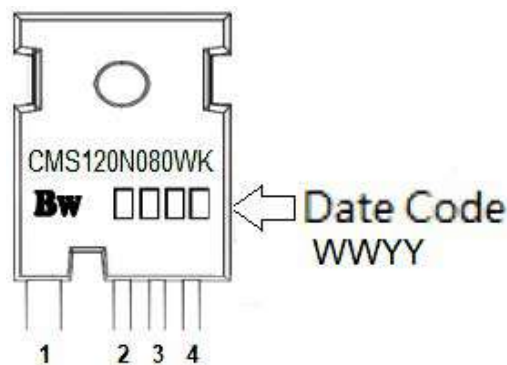
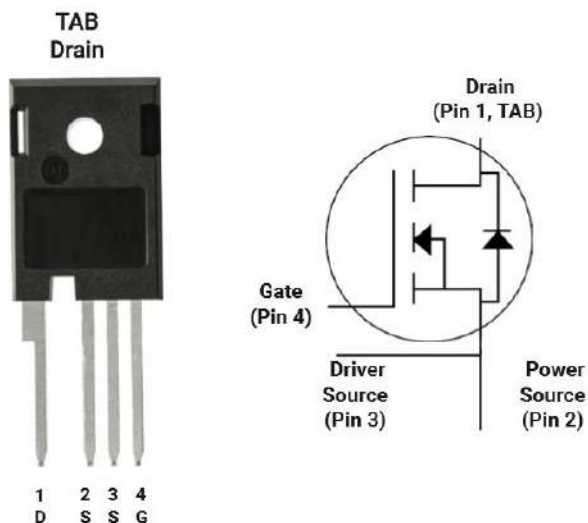
Package type : TO-247-4

Package Dimension



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.189	.205	4.80	5.20
A1	.090	.098	2.30	2.50
A2	.075	.083	1.90	2.10
b	.043	.055	1.10	1.40
b1	.063	.071	1.60	1.80
c	.020	.031	0.50	0.80
D	.819	.839	20.80	21.30
D1	.630	.670	16.00	17.00
D2	.118	.138	3.00	3.50
E	.620	.636	15.75	16.15
E1	.531	.559	13.50	14.20
E2	.169	.193	4.30	4.90
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
L	.780	.799	19.80	20.30
L1	.157	.177	4.00	4.50
ØP	.140	.144	3.55	3.65
ØP1	.280	.287	7.10	7.30
Q	.213	.236	5.40	6.00
S	.242 BSC		6.15 BSC	

Marking



RoHS Compliant

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	1200	V
V_{GS}	Gate-Source Voltage	-5/20	V
I_D	Continuous Drain Current ($T_C=25^{\circ}C$)	35	A
	Continuous Drain Current($T_C=100^{\circ}C$)	25	A
$I_{D,pulse}$	Pulsed Drain Current	80	A
P_{tot}	Power Dissipation ($T_C=25^{\circ}C$)	188	W
E_{AS}	Single Pulse Avalanche Energy, $I_{AS}=20A$, $V=50V$, $L=1mH$	200	mJ
T_J/T_{STG}	Operating Junction and Storage Temperature	-55...175	$^{\circ}C$

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient	40	$^{\circ}C/W$
$R_{\theta JC}$	Maximum Junction-to-Case	0.8	$^{\circ}C/W$

Static Electrical Characteristics, ($T_J=25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=10mA$	2.0	2.8	4.0	V
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=1mA$	1200	-	-	V
I_{GSS+}	Gate-Source Leakage Current	$V_{DS}=0V$, $V_{GS}=20V$	-	0.1	100	nA
I_{GSS-}		$V_{DS}=0V$, $V_{GS}=-5V$	-	-	-100	
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=1200V$, $V_{GS}=0V$	-	-	1.0	μA
		$V_{DS}=1200V$, $V_{GS}=0V$, $T_J=175^{\circ}C$	-	1.0	-	
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=20V$, $I_D=20A$	-	77	100	m Ω
		$V_{GS}=20V$, $I_D=10A$	-	71	90	
		$V_{GS}=20V$, $I_D=20A$, $T_J=125^{\circ}C$	-	106	-	
		$V_{GS}=20V$, $I_D=20A$, $T_J=175^{\circ}C$	-	134	-	
R_g	Gate Input Resistance	$f=1MHz$, $V_{AC}=25mV$, D-S short	-	3.0	-	Ω

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AC Electrical Characteristics, ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge	$V_{DD}=800\text{ V}$, $I_{DS}=20\text{ A}$, $V_{GS}=-5/20\text{ V}$	-	61	-	nC
Q_{gs}	Gate-Source Charge		-	24	-	
Q_{gd}	Gate-Drain Charge		-	14	-	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=800\text{ V}$, $I_{DS}=20\text{ A}$, $R_{G(ext)}=2.5\ \Omega$, $V_{GS}=-5/+20\text{ V}$, $L=975\ \mu\text{H}$	-	9	-	ns
t_r	Rise Time		-	4	-	
$t_{d(off)}$	Turn-Off Delay Time		-	15	-	
t_f	Fall Time		-	10	-	
C_{ISS}	Input Capacitance	$V_{GS}=0\text{ V}$, $V_{DS}=1000\text{ V}$, $f=200\text{ kHz}$, $V_{AC}=25\text{ mV}$	-	1377	-	pF
C_{OSS}	Output Capacitance		-	62	-	
C_{RSS}	Reverse Transfer Capacitance		-	4	-	
E_{OSS}	Coss Stored Energy		-	38	-	μJ
E_{on}	Turn-On Switching Energy	$V_{DD}=800\text{ V}$, $I_{DS}=20\text{ A}$, $R_{G(ext)}=2.5\ \Omega$, $V_{GS}=-5/+20\text{ V}$, $L=975\ \mu\text{H}$	-	208	-	
E_{off}	Turn-Off Switching Energy		-	25	-	
E_{tot}	Total Switching Energy		-	233	-	

Body Diode Characteristics, ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_S	Max Continuous Diode Forward Current	$V_{GS}=-5\text{ V}$, $T_C=25^{\circ}\text{C}$	-	-	43	A
V_{SD}	Diode Forward Voltage	$V_{GS}=-5\text{ V}$, $I_S=10\text{ A}$	-	3.8	-	V
t_{rr}	Reverse Recovery Time	$I_S=20\text{ A}$, $V_R=800\text{ V}$, $V_{GS}=-5\text{ V}$, $di/dt=8\text{ A}/\mu\text{s}$	-	8	-	ns
Q_{rr}	Reverse Recovery Charge		-	130	-	nC
I_{rrm}	Peak Reverse Recovery Current		-	29	-	A

- Typical Electrical Characteristics

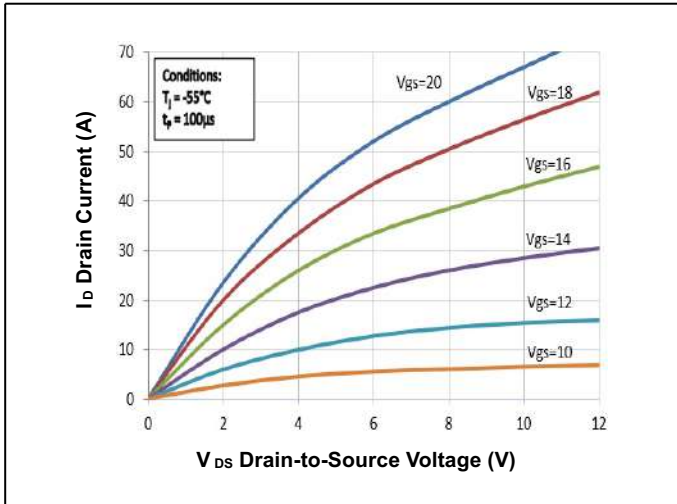


FIG.1-Output Characteristics $T_J = -55^\circ\text{C}$

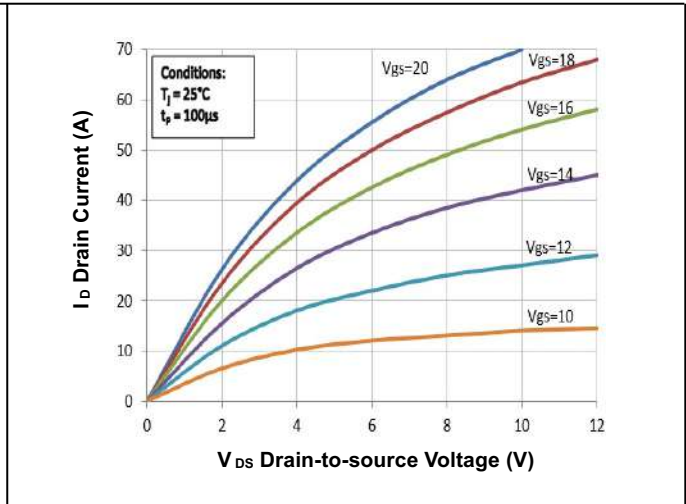


FIG.2- Output Characteristics $T_J = 25^\circ\text{C}$

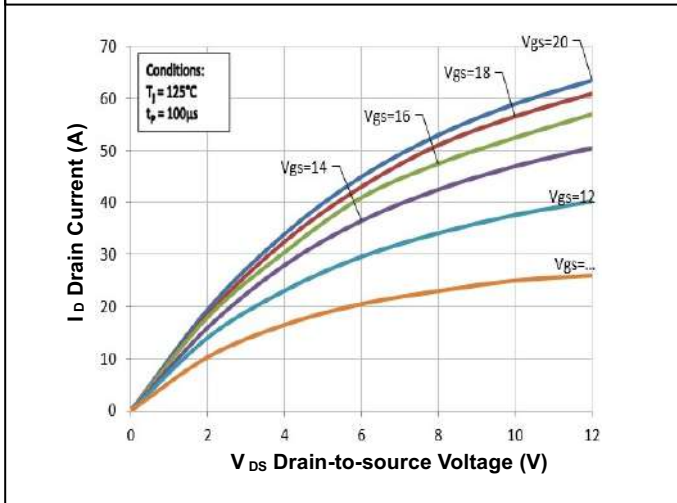


FIG.3- Output Characteristics $T_J = 125^\circ\text{C}$

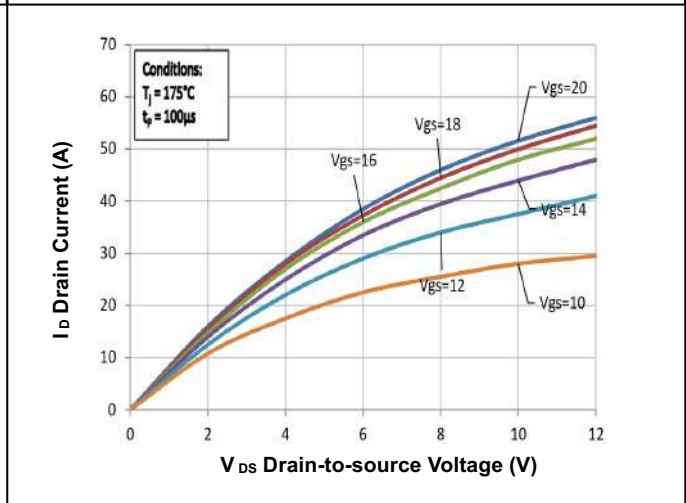


FIG.4- Output Characteristics $T_J = 175^\circ\text{C}$

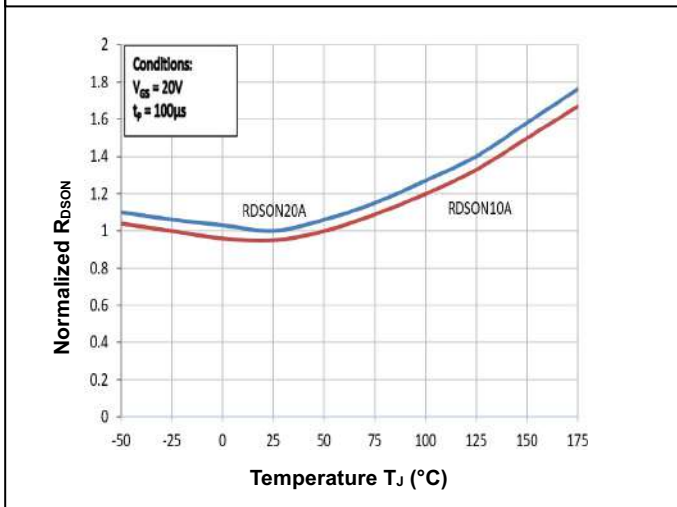


FIG.5-Normalized $R_{DS(on)}$ vs. Temperature T_J

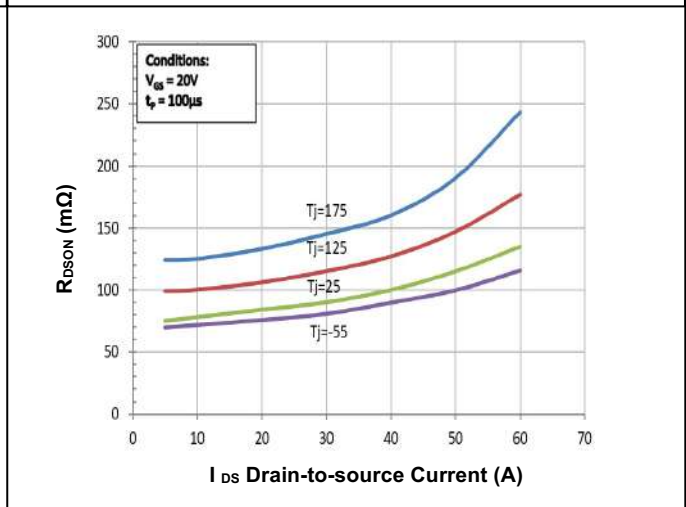


FIG.6- On-Resistance vs. Drain Current For Various Temperature

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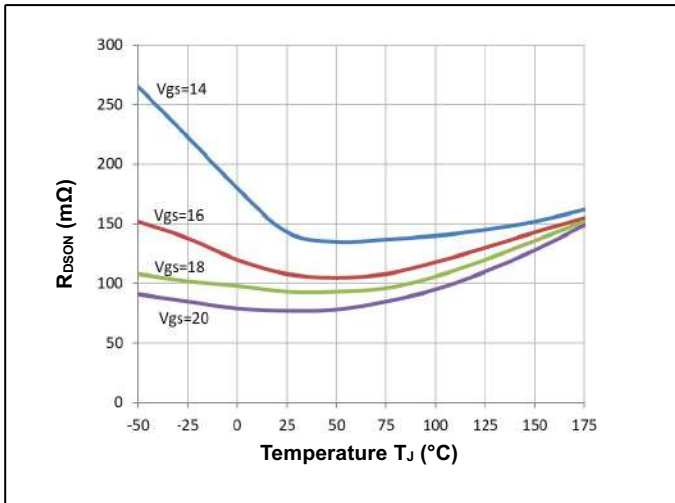


FIG.7- On-Resistance vs. Temperature For Various Gate Voltages

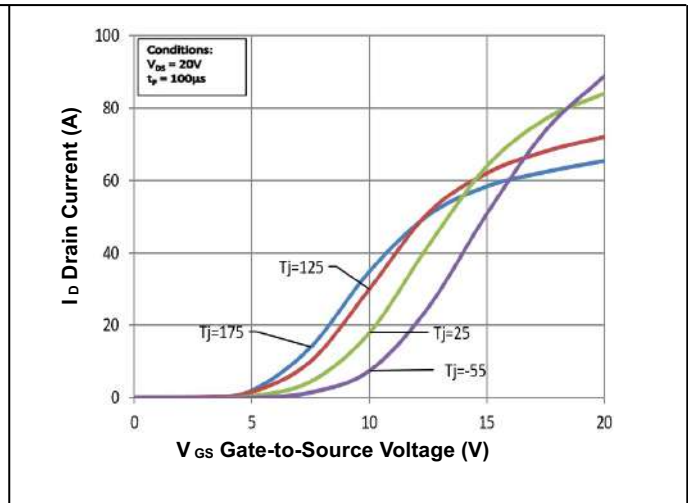


FIG.8- Transfer Characteristic for Various Junction Temperatures

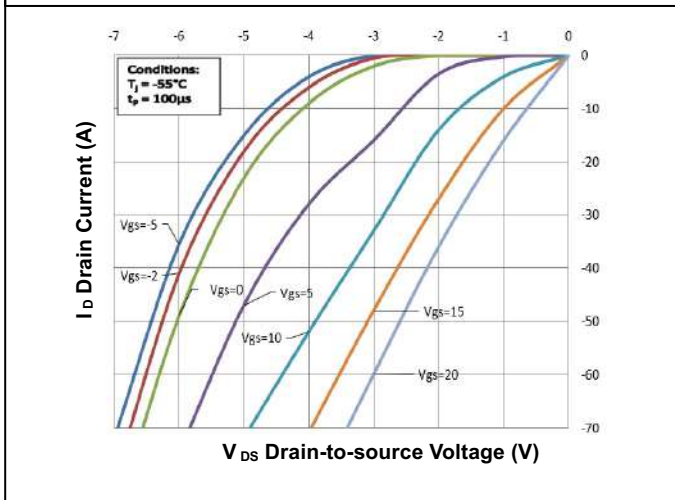


FIG.9- Body Diode Characteristics at $T_J = -55^{\circ}C$

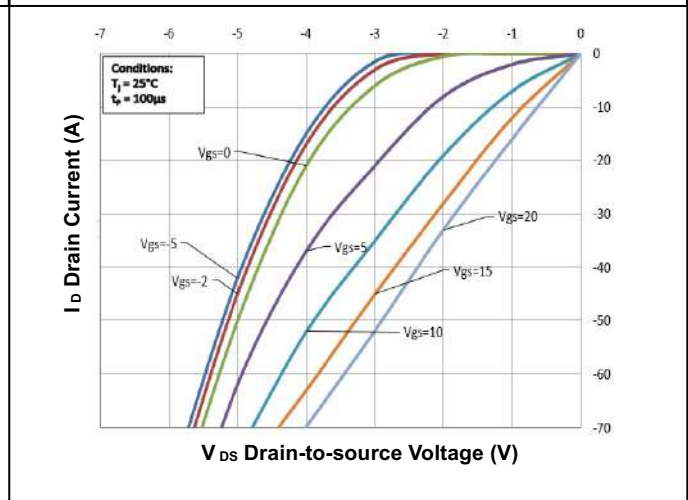


FIG.10- Body Diode Characteristics at $T_J = 25^{\circ}C$

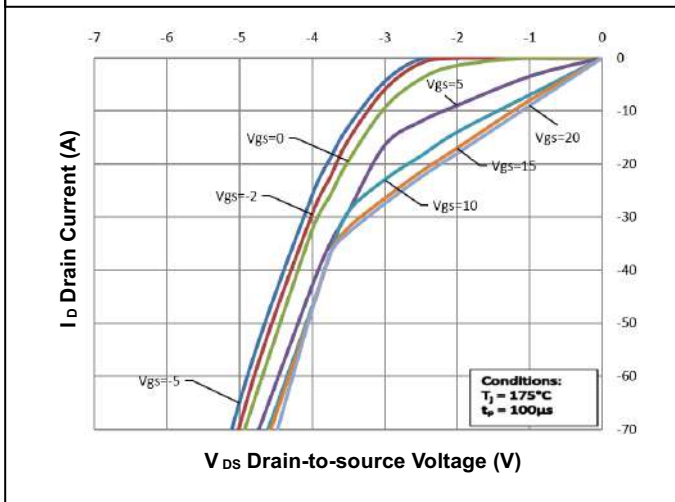


FIG.11- Body Diode Characteristics at $T_J = 175^{\circ}C$

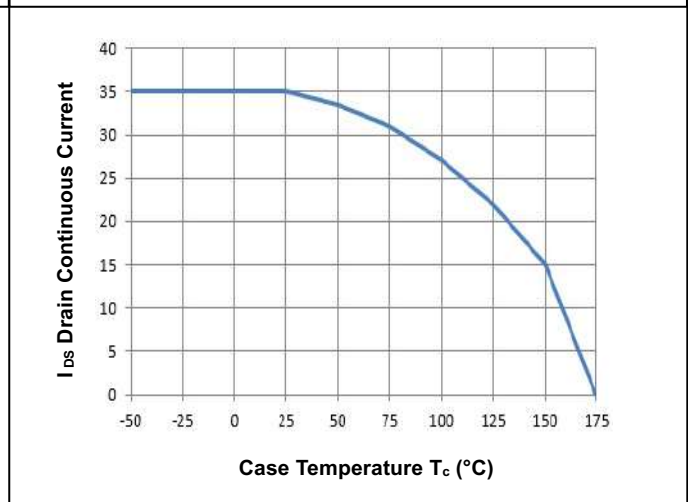


FIG.12- Continuous Drain Current Derating vs. T_c

• Typical Electrical Characteristics

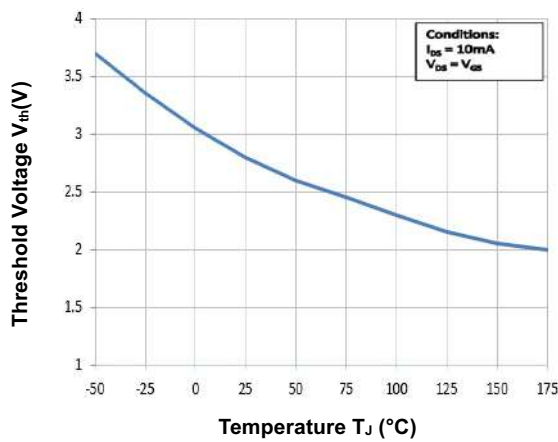


FIG.13-Threshold Voltage vs. Temperature

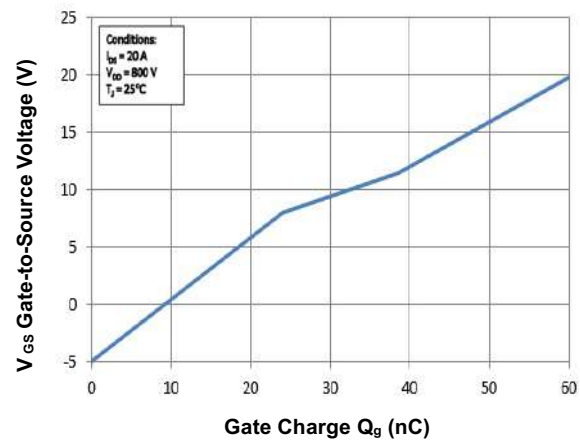


FIG.12- Gate Charge Characteristics

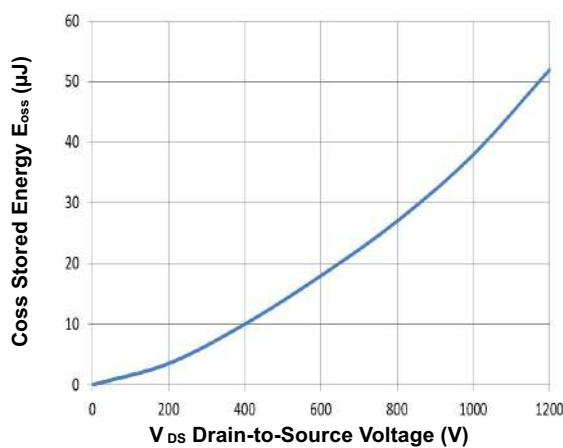


FIG.15- Output Capacitor Stored Energy

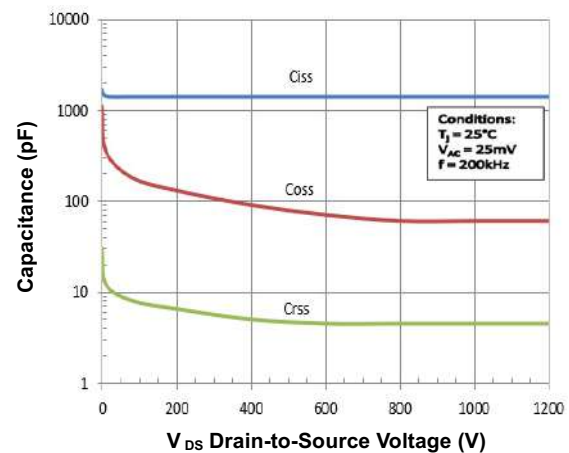


FIG.16- Capacitance vs Drain-Source Voltage

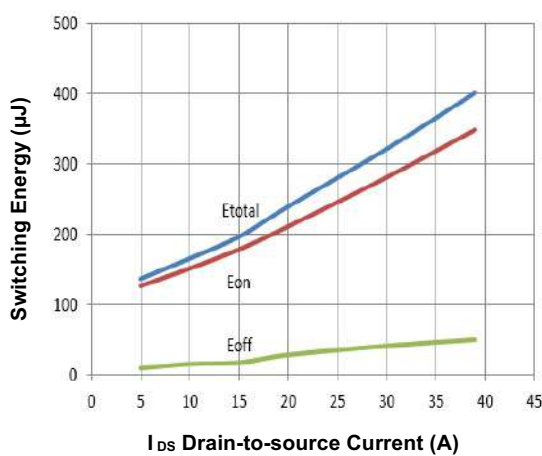


FIG.17- Clamped Inductive Switching Energy vs. Drain Current Various

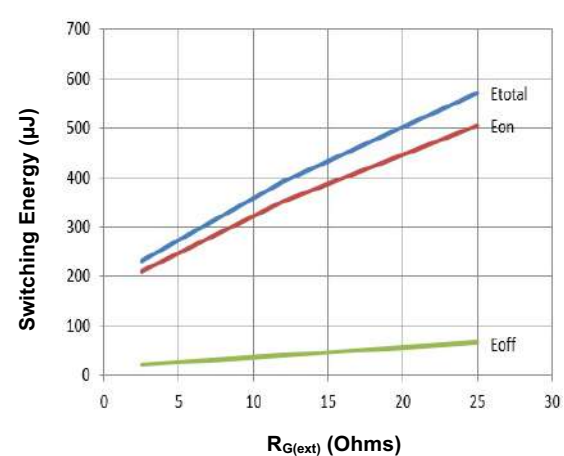


FIG.18- Clamped Inductive Switching Energy vs. $R_{G(ext)}$

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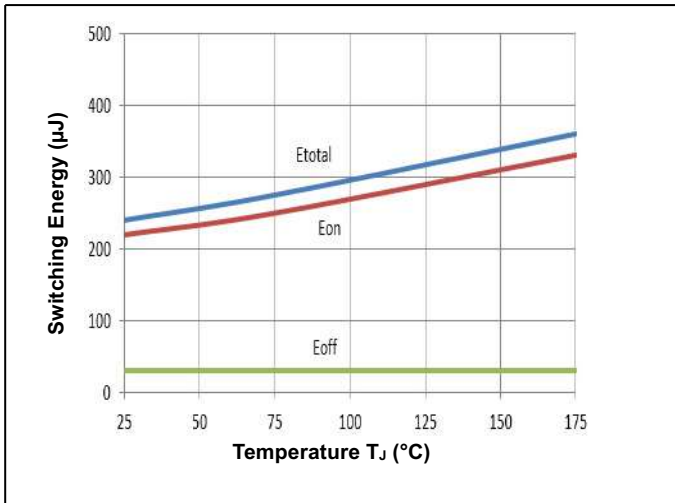


FIG.19-Clamped Inductive Switching Energy vs. Temperature

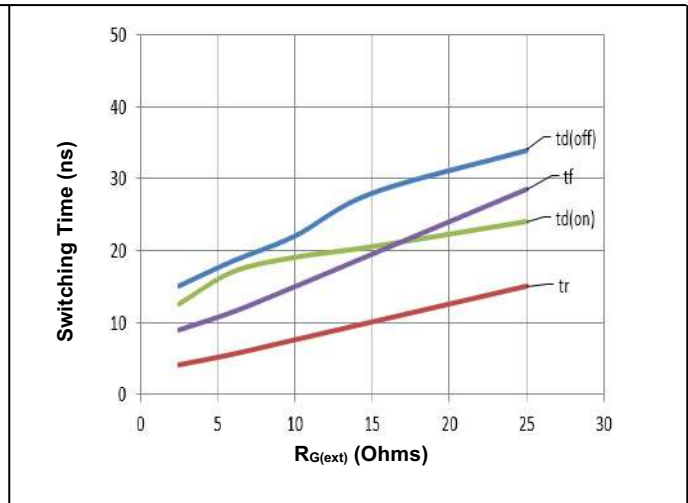


FIG.20- Switching Times vs $R_{G(\text{ext})}$

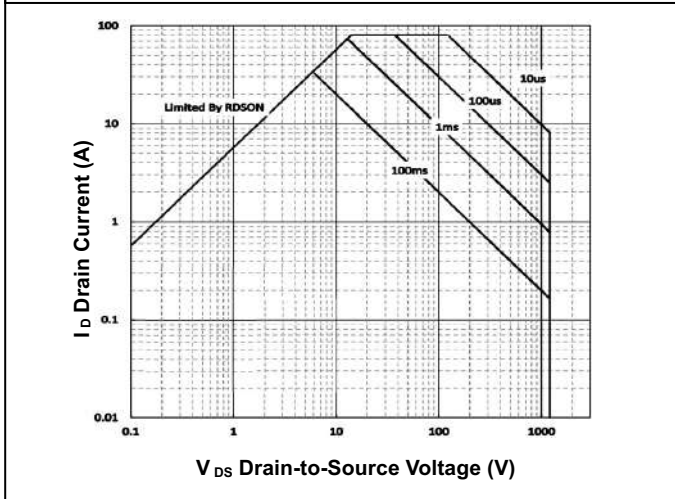


FIG.21- Safe Operating Area

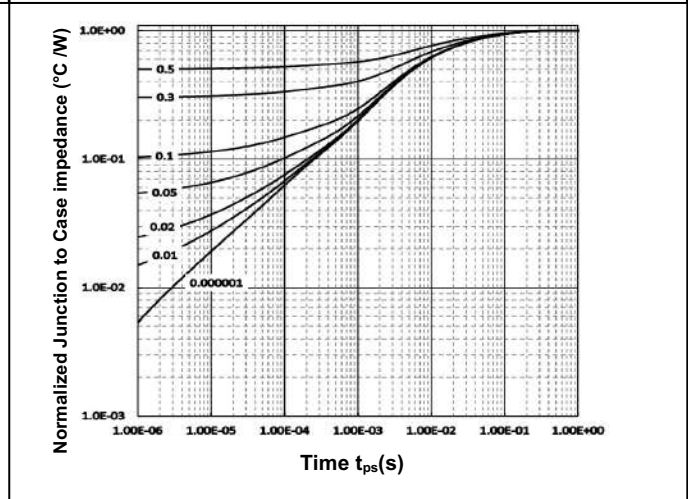


FIG.22- Transient Thermal impedance (Junction to Case)

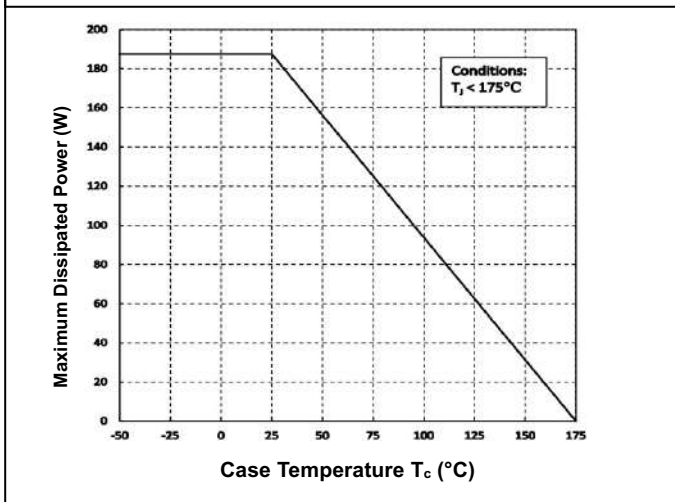


FIG.23- Maximum Power Dissipation Derating vs Case Temperature

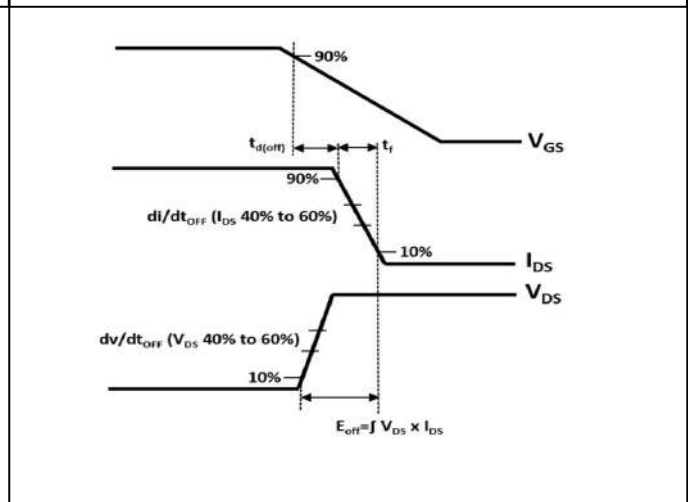


FIG.24- Turn-off Transient Definitions

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- Typical Electrical Characteristics

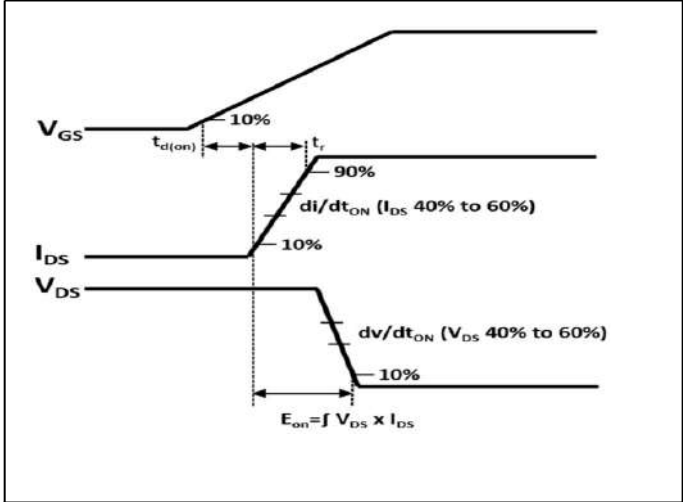


FIG.25-Turn-on Transient Definitions

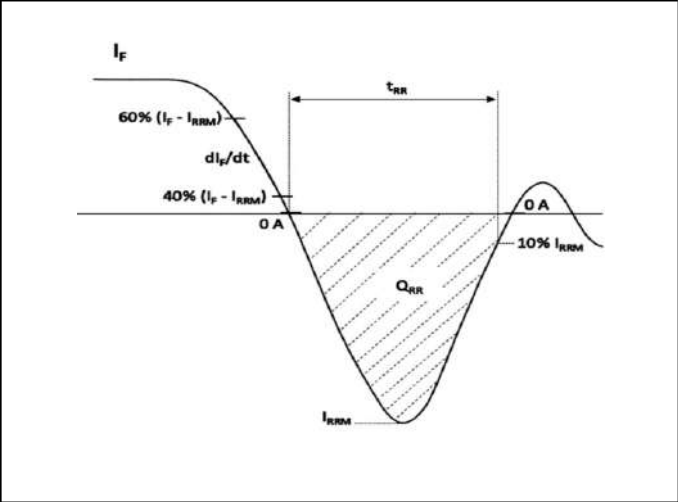


FIG.26- Reverse Recovery Definitions

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