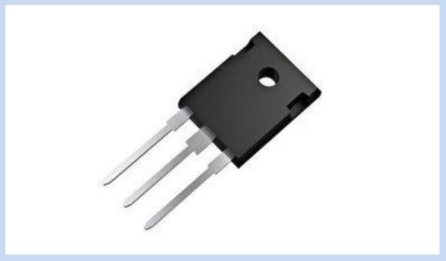
Silicon Carbide MOSFET
N-Channel 650V 108A TO-247

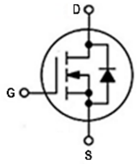
MFTC65N108T247

MERITEK

FEATURE

- $R_{DS(ON)}$<30mΩ at V_{GS}=18V, I_D=40A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed Switching
- Low Reverse Recovery Charge
- Applications: High Voltage DC/DC Converters, Switching Mode Power Supplier, Renewable Energy, On Board Charger





RoHS

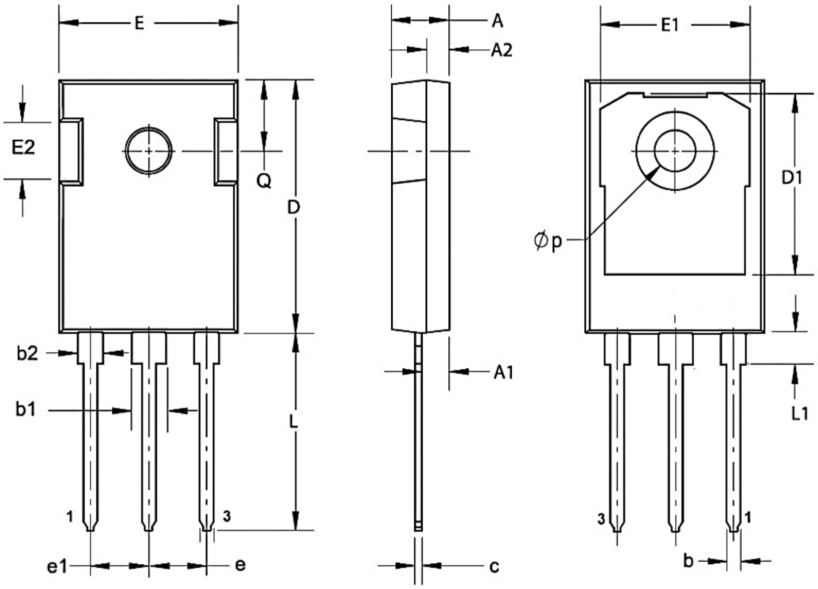
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100μA	V_{DS}	650	V
Gate-Source Voltage	AC (f >1Hz)	V_{GS}	-10/+25	V
	Static		-4/+15 -4/+18	
Drain Current – Continuous	V_{GS} =18V, T_C=25°C	I_D	108	A
	V_{GS} =18V, T_C=100°C		76	
Drain Current – Pulse width t_p Limited by T_{jmax}		I_{DM}	193	A
Power Dissipation	T_J=175°C	P_D	341	W
Thermal Resistance, Junction to Case (Typ.)		$R_{\theta JC}$	0.44	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

Item	Min (mm)	Max (mm)
A	4.70	5.30
A1	2.24	2.58
A2	1.80	2.20
b	1.00	1.40
b1	2.60	3.60
b2	1.60	2.60
c	0.40	0.80
D	20.00	21.34
D1	17.43	17.83
e	5.39	5.49
e1	5.39	5.49
E	15.50	16.13
E1	13.06	13.51
E2	4.85	5.15
L	19.70	20.25
L1	3.85	4.49
p	3.45	3.75
Q	6.15 BSC	

Note: Pin Layout: 1:Gate(G), 2:Drain(D), 3:Source(S)

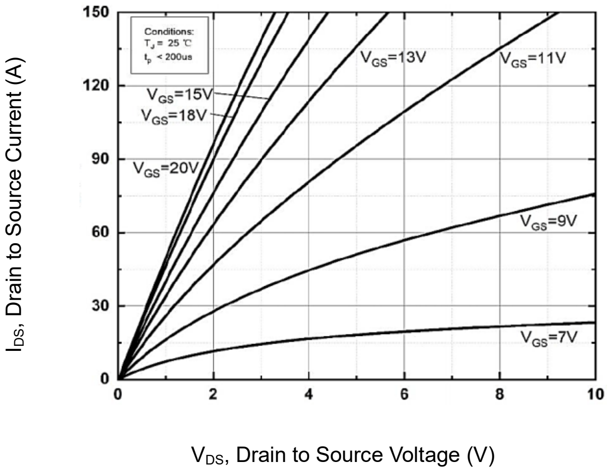


ELECTRICAL CHARACTERISTICS

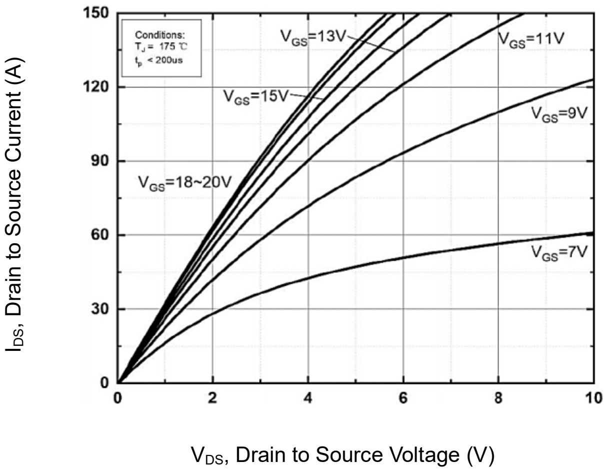
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100µA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	--	50	µA
Gate-Source Leakage Current	V_{GS}=18V, V_{DS}=0V	I_{GSS}	--	--	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=15V, I_D=40A	$R_{DS(ON)}$	--	24	--	mΩ
	V_{GS}=18V, I_D=40A		--	20	30	
	V_{GS}=15V, I_D=40A, T_J=175°C		--	30	--	
	V_{GS}=18V, I_D=40A, T_J=175°C		--	28	--	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=20mA	$V_{GS(th)}$	--	2.6	--	V
	V_{GS}=V_{DS}, I_D=20mA, T_J=175°C		--	1.8	--	
Transconductance	V_{DS}=15V, I_D=40A	g_{FS}	--	25	--	S
	V_{DS}=15V, I_D=40A, T_J=175°C		--	25	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=400V, I_D=40A V_{GS}= -4/+18V	Q_g	--	142	--	nC
Gate-Source Charge		Q_{gs}	--	35	--	
Gate-Drain Charge		Q_{gd}	--	17	--	
Input Capacitance	V_{DS}=600V, V_{GS}=0V V_{AC}=25mV, f=100KHz	C_{iss}	--	2935	--	pF
Output Capacitance		C_{oss}	--	221	--	
Reverse Transfer Capacitance		C_{rss}	--	16.6	--	
Internal Gate Resistance	V_{AC}=25mV, f=1MHz	$R_{G(int)}$	--	1.2	--	Ω
Turn-On Delay Time	V_{DS}=400V, V_{GS}= -4/+18V, I_D=40A, $R_{G(ext)}$=5Ω, L=200µH	$T_{d(on)}$	--	3	--	nS
Rise Time		T_r	--	29	--	
Turn-Off Delay Time		$T_{d(off)}$	--	32	--	
Fall Time		T_f	--	9	--	
Turn-On Switching Energy	V_{DS}=400V, V_{GS}= -4/+18V, I_D=40A, $R_{G(ext)}$=5Ω, L=200µH	E_{on}	--	181	--	µJ
Turn-Off Switching Energy		E_{off}	--	151	--	
Total Switching Energy		E_{tot}	--	332	--	
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Forward Current	V_{GS}= -4V, T_C=25°C	I_S	--	81	--	A
Diode Pulse Current - Pulse width tp Limited by Tjmax	V_{GS}= -4V	$I_{S,Pulse}$	--	193	--	A
Diode Forward Voltage	V_{GS}= -4V, I_{SD}=20A	V_{SD}	--	3.7	--	V
	V_{GS}= -4V, I_{SD}=20A, T_J=175°C		--	3.2	--	
Reverse Recovery Time	V_{GS}= -4V, I_{SD}=40A, V_R=400V, dif/dt=2200A/µs	t_{rr}	--	19	--	nS
Reverse Recovery Charge		Q_{rr}	--	238	--	nC
Peak Reverse Recovery Current		I_{rrm}	--	17	--	A

CHARACTERISTIC CURVES

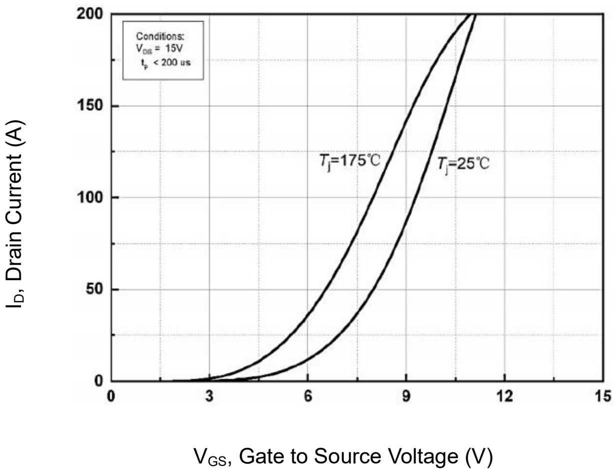
Output Characteristics at T_J=25°C



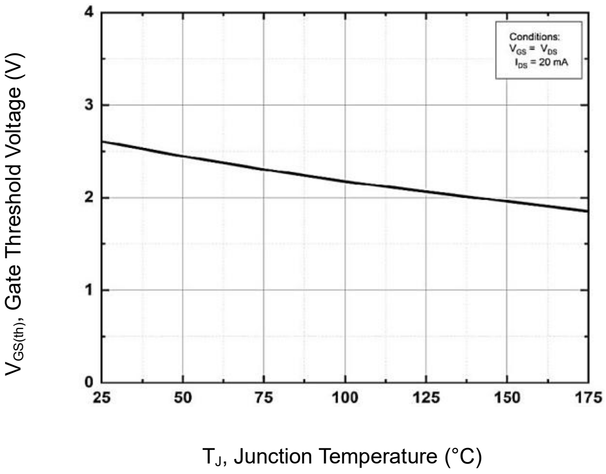
Output Characteristics at T_J=175°C



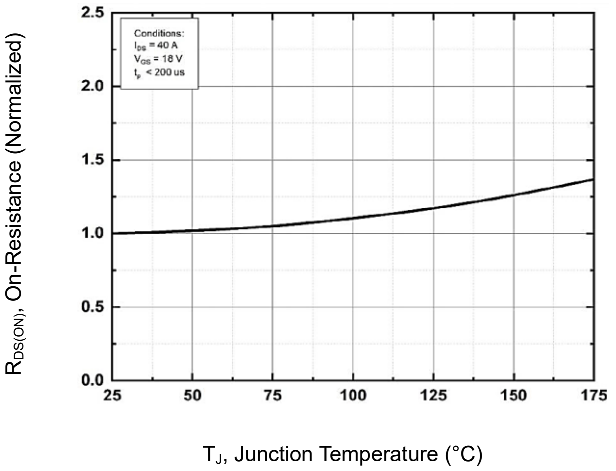
Transfer Characteristics



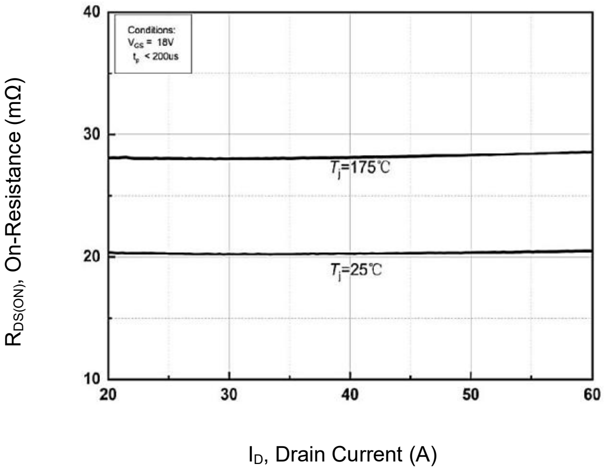
Threshold Voltage vs. Junction Temperature



Normalized On-Resistance vs. Junction Temperature

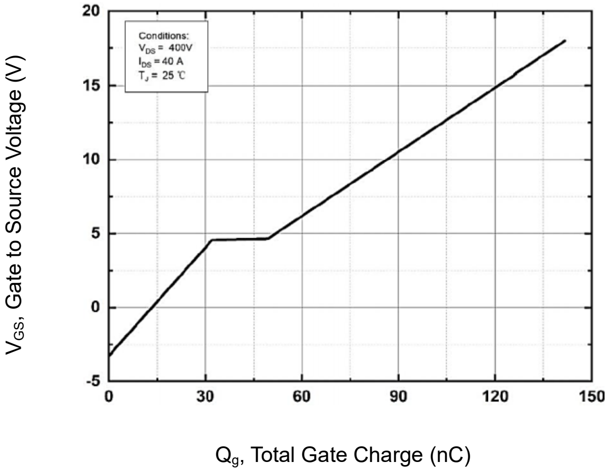


On-Resistance vs. Drain Current

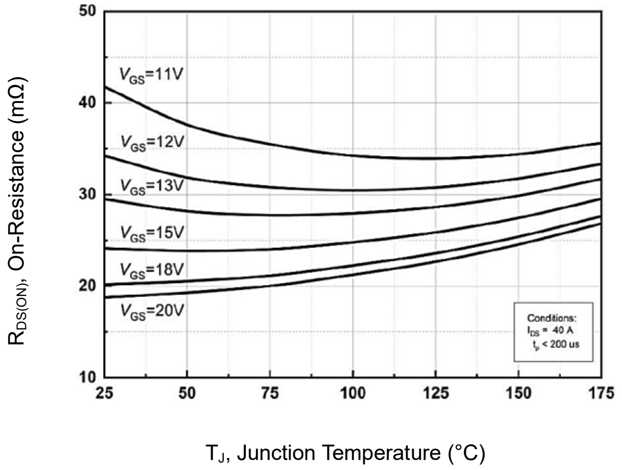


CHARACTERISTIC CURVES

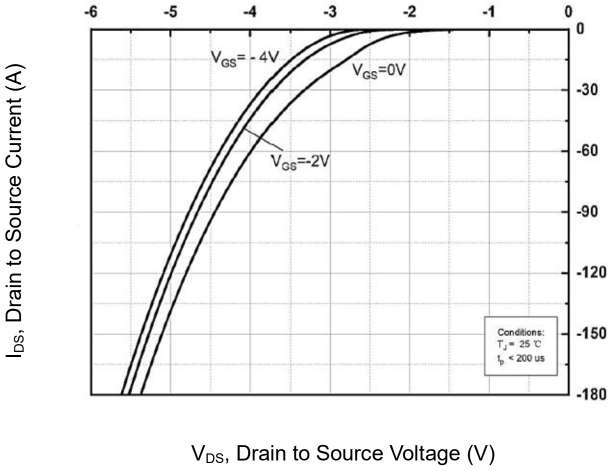
Gate-Charge Characteristics



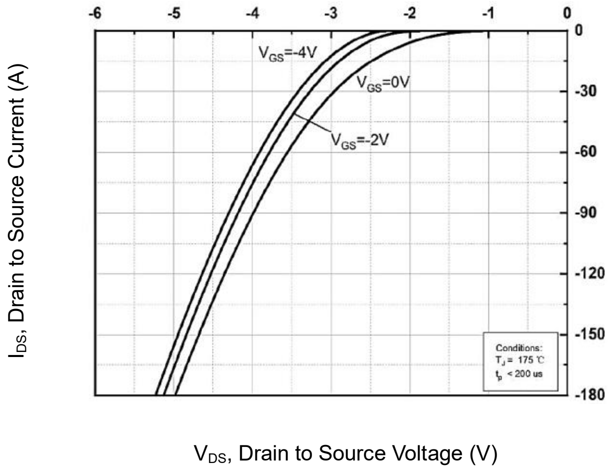
On-Resistance vs. Junction Temperature for V_{GS}



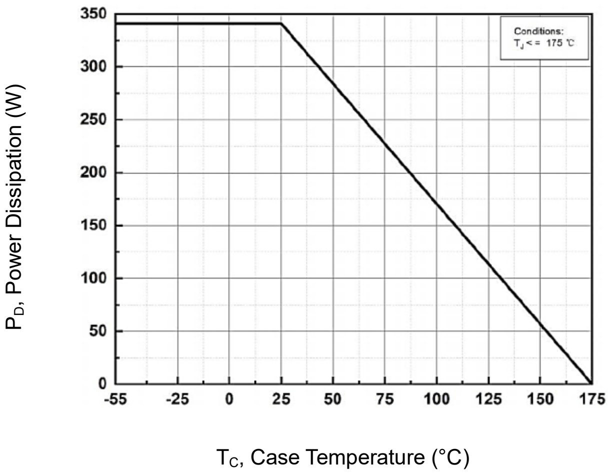
Body Diode Characteristics at T_J=25°C



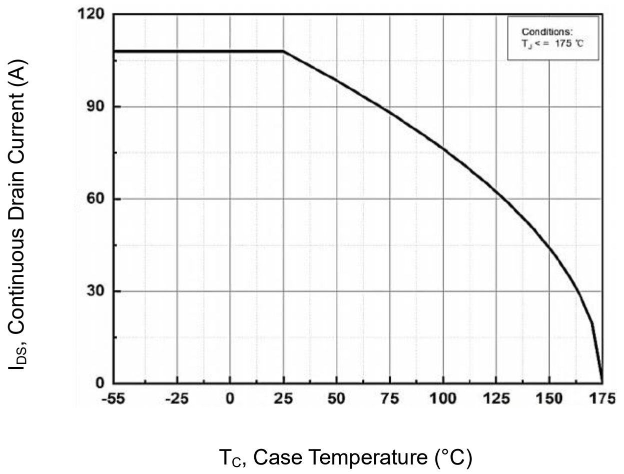
Body Diode Characteristics at T_J=175°C



Maximum Power Dissipation Derating

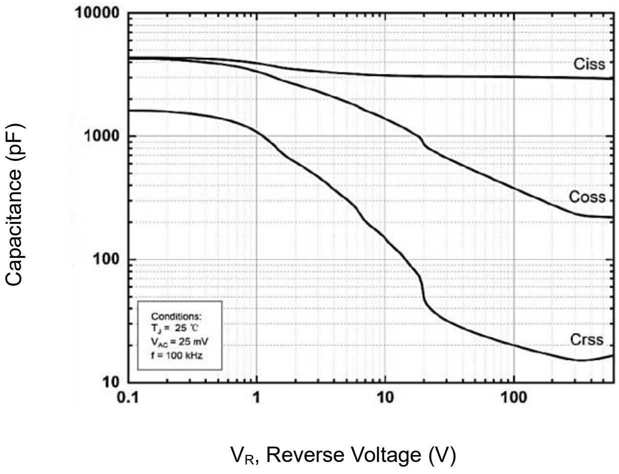


Continuous Drain Current Derating vs. Case Temperature

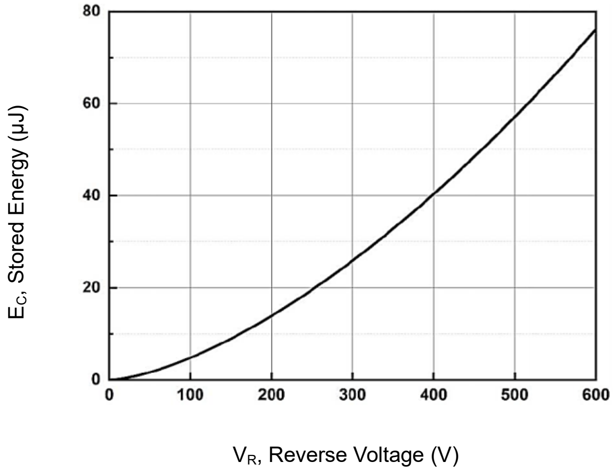


CHARACTERISTIC CURVES

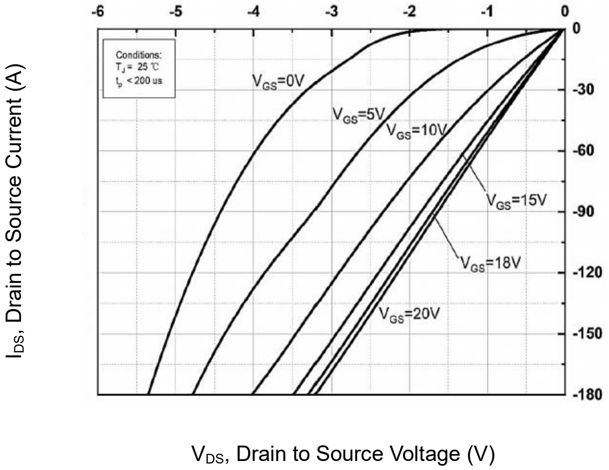
Capacitance vs. Drain-Source Voltage



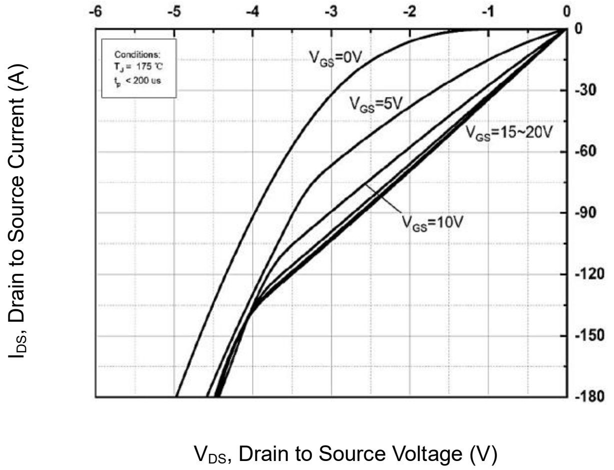
Output Capacitor Stored Energy



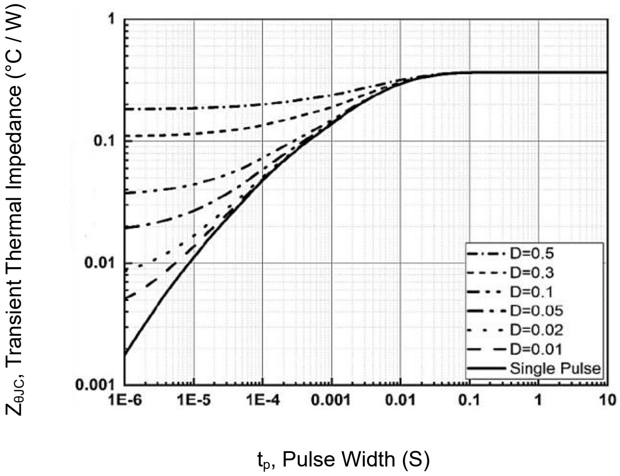
3rd Quadrant Characteristics at T_J=25°C



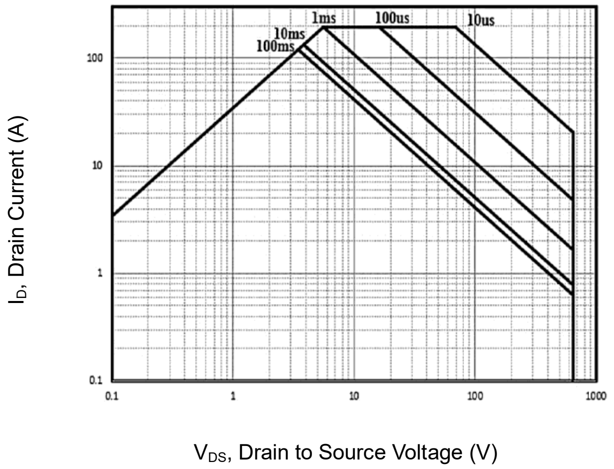
3rd Quadrant Characteristics at T_J=175°C



Transient Thermal Impedance

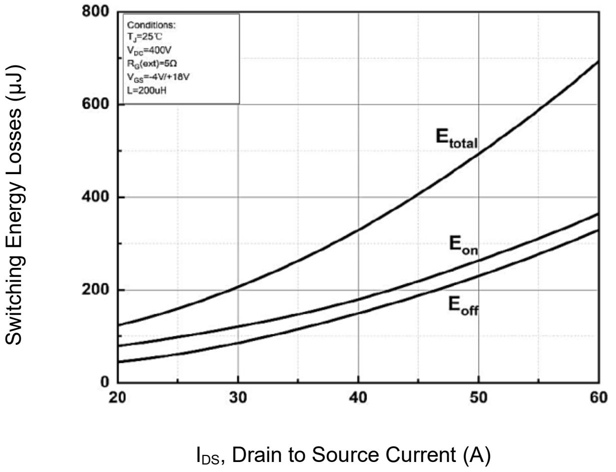


Safe Operating Area

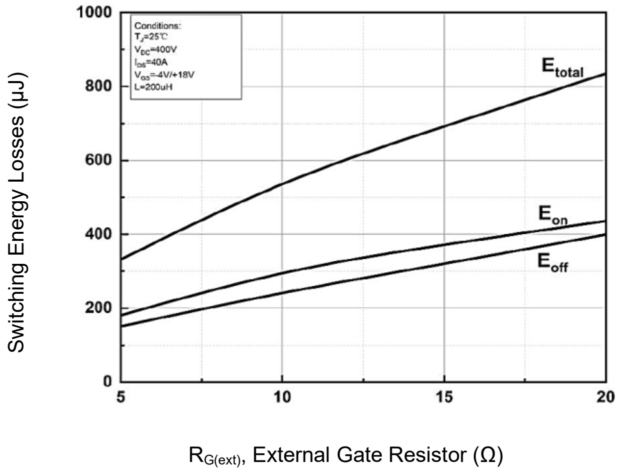


CHARACTERISTIC CURVES

Clamped Inductive Switching Energy vs. Drain Current



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



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