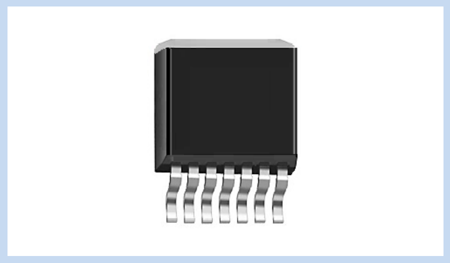
Silicon Carbide MOSFET
N-Channel 650V 92A TO-263-7

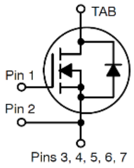
MFTC65N92T2637

MERITEK

FEATURE



- $R_{DS(ON)}$<30mΩ at V_{GS}=18V, I_D=50A
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low Reverse Recovery Charge
- Applications: High Voltage DC-DC Converter, Switch Mode Power Supplier, Renewable Energy, EV Battery Chargers



RoHS

MECHANICAL DATA

- Case: TO-263-7 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

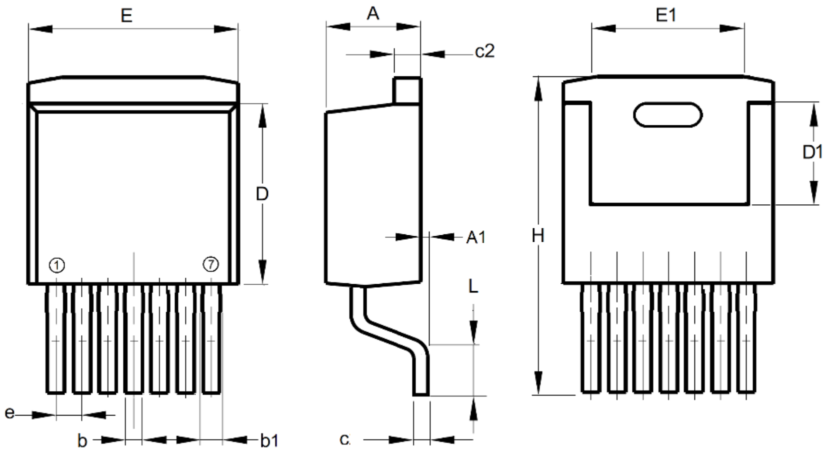
MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	V_{GS}=0V, I_D=100µA	V_{DS}	650	V
Gate-Source Voltage	Absolute Maximum Value	V_{GS}	-8/+22	V
	Recommended operational values		-4/+18	
Continuous Drain Current	V_{GS}=18V, T_C=25°C	I_D	92	A
	V_{GS}=18V, T_C=100°C		64	
Power Dissipation	T_C=25°C	P_D	312	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.48	°C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

DIMENSIONS

DIMENSION	Min (mm)	Max (mm)
A	4.30	4.60
A1	0	0.25
b	0.50	0.70
b1	0.60	0.90
c	0.40	0.60
c2	1.20	1.40
D	8.88	9.28
D1	4.65	6.65
e	1.27 BSC	
E	10.08	10.28
E1	6.82	7.97
H	14.80	16.00
L	1.90	2.75

Note: Pin Layout: Tab: Drain; 1: Gate; 2: Driver Source; 3,4,5,6,7,8: Power Source

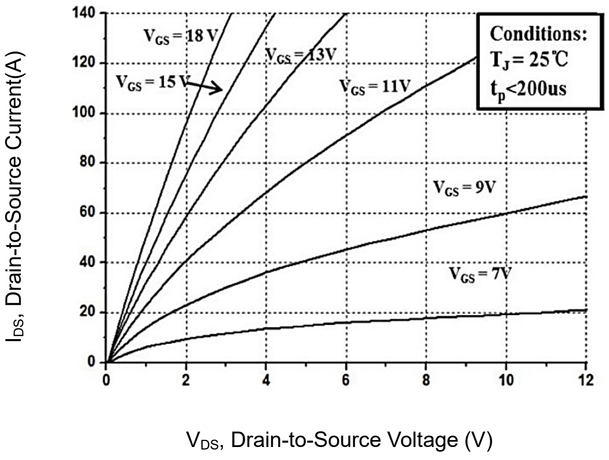


ELECTRICAL CHARACTERISTICS

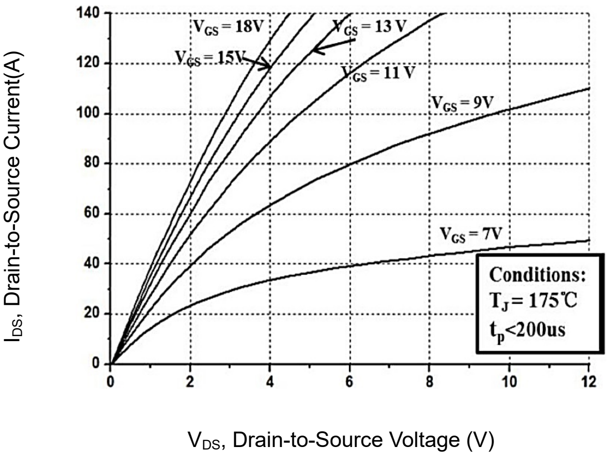
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100µA	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=650V, V_{GS}=0V	I_{DSS}	--	1	100	µA
Gate-Body Leakage Current, Forward	V_{GS}=22V, V_{DS}=0V	I_{GSSF}	--	10	250	nA
Gate-Body Leakage Current, Reverse	V_{GS}=-8V, V_{DS}=0V	I_{GSSR}	--	10	250	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=18V, I_D=50A	$R_{DS(ON)}$	--	20	30	mΩ
	V_{GS}=18V, I_D=50A, T_J=175°C		--	28	--	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=15mA	$V_{GS(th)}$	1.9	2.6	4.0	V
	V_{GS}=V_{DS}, I_D=15mA, T_J=175°C		--	1.8	--	
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=400V, I_D=40A, V_{GS}= -4/+18V	Q_g	--	187	--	nC
Gate-Source Charge		Q_{gs}	--	49	--	
Gate-Drain Charge		Q_{gd}	--	31	--	
Turn-On Delay Time	V_{DS}=400V, I_D=40A, R_L=20Ω, V_{GS}= -4/+18V, R_{GEN}=2.5Ω	$T_{d(on)}$	--	17	--	nS
Rise Time		T_r	--	15	--	
Turn-Off Delay Time		$T_{d(off)}$	--	65	--	
Fall Time		T_f	--	14	--	
Turn-On Switching Loss	V_{DS}=400V, I_D=40A, L=100µH, V_{GS}= -4/+18V, R_{GEN}=2.5Ω	E_{ON}	--	0.52	--	mJ
Turn-Off Switching Loss		E_{OFF}	--	0.7	--	
Input Capacitance	V_{DS}=600V, V_{GS}=0V, V_{AC}=25mV f=1MHz	C_{iss}	--	3180	--	pF
Output Capacitance		C_{oss}	--	281	--	
Reverse Transfer Capacitance		C_{rss}	--	33	--	
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Drain-Source Diode Forward Voltage	V_{GS}= -4V, I_{SD}=25A	V_{SD}	--	4.2	--	V
	V_{GS}= -4V, I_{SD}=25A, T_J=175°C		--	3.9	--	
Diode Forward Current - Continuous	T_C=25°C	I_S	--	--	92	A
Peak Reverse Recovery Current	V_R=400V, I_{SD}=40A	I_{rm}	--	3.4	--	A
Reverse Recovery Time		T_{rr}	--	26	--	nS
Reverse Recovery Charge		Q_{rr}	--	58	--	nC

CHARACTERISTIC CURVES

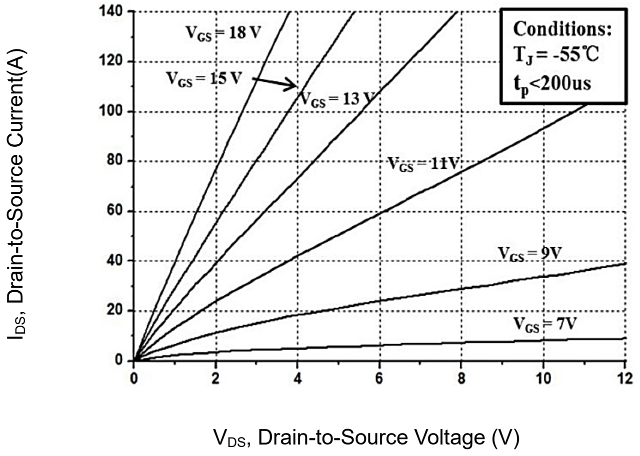
Output Characteristics



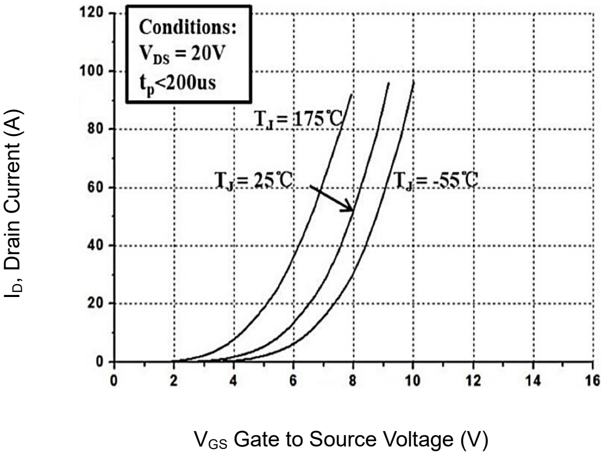
Output Characteristics



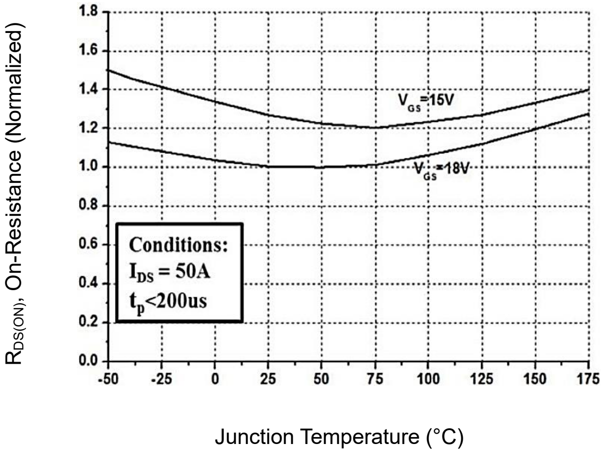
Output Characteristics



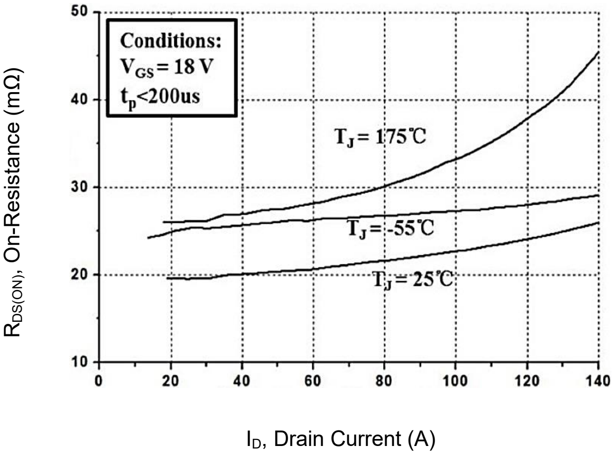
Transfer Characteristic



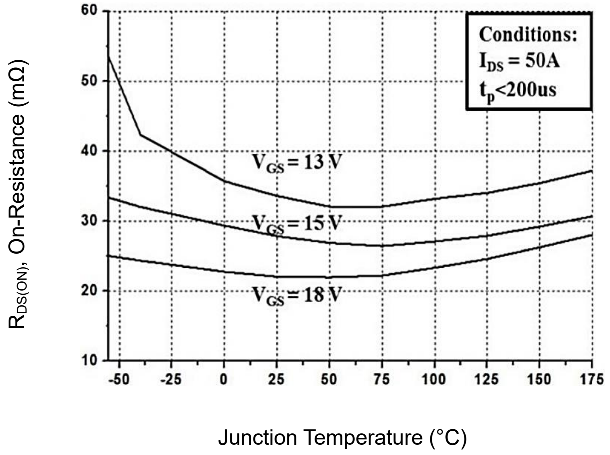
Normalized On-Resistance vs. Junction temperature

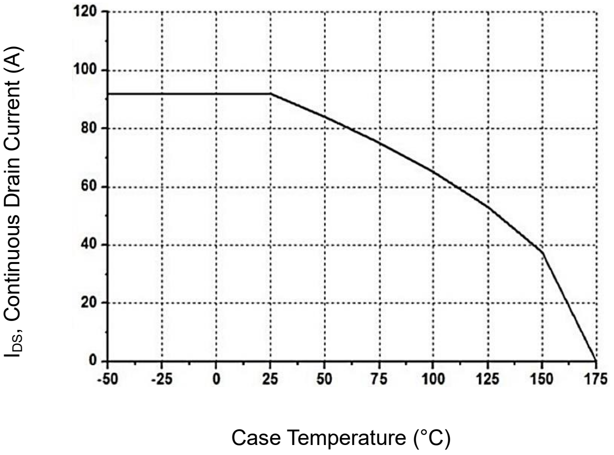


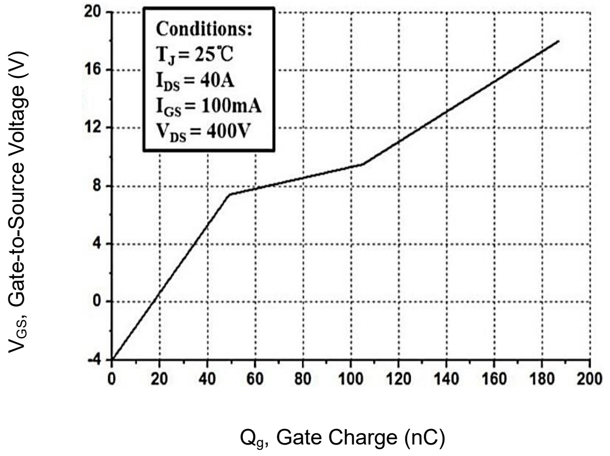
On-Resistance vs. Drain Current

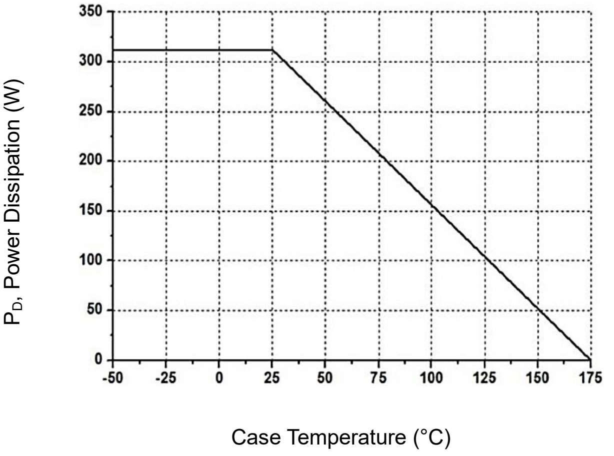


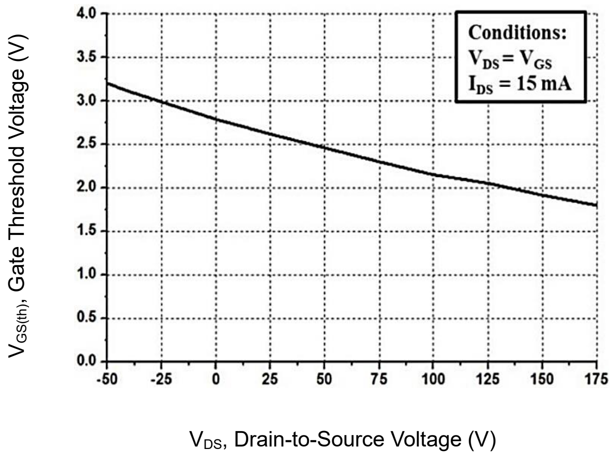
CHARACTERISTIC CURVES

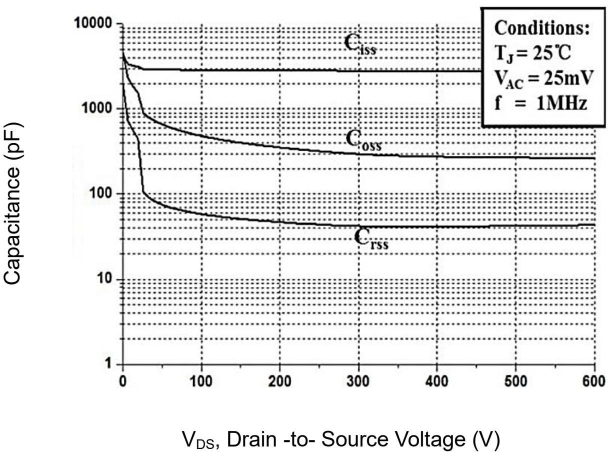

On-Resistance vs. Junction temperature for V_{GS}


Continuous Drain Current vs. Case Temperature


Gate-Charge Characteristics

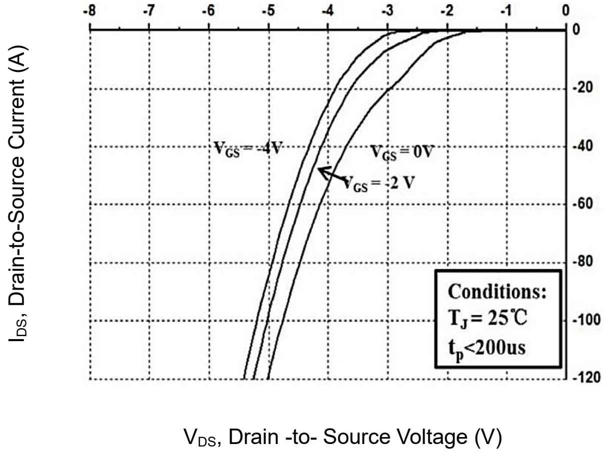

Maximum Power Dissipation Derating


Threshold Voltage vs. Junction temperature

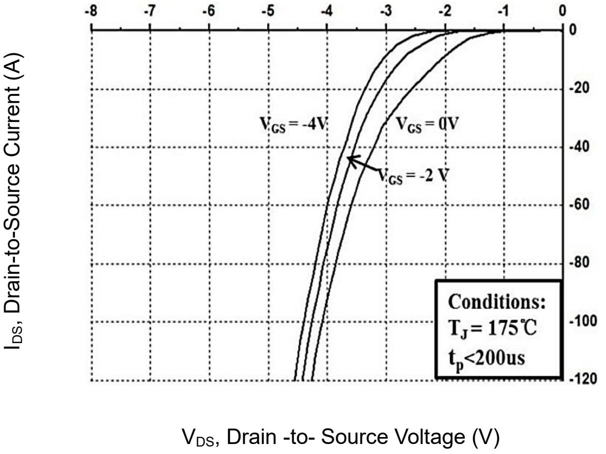

Capacitance vs. Drain-Source Voltage

CHARACTERISTIC CURVES

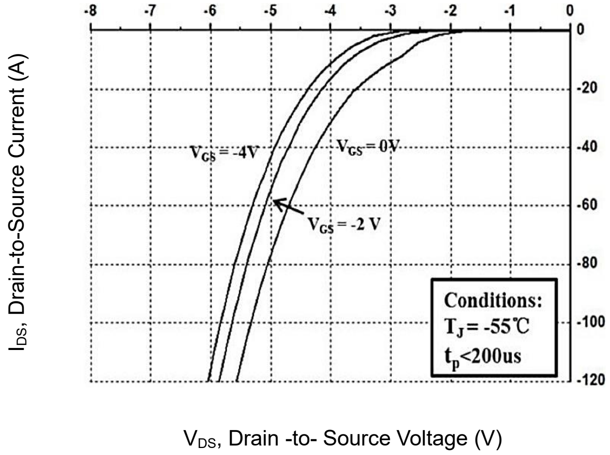
Body Diode Characteristics



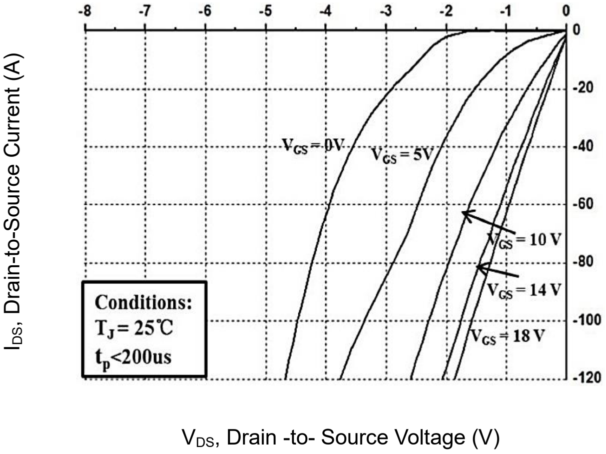
Body Diode Characteristics



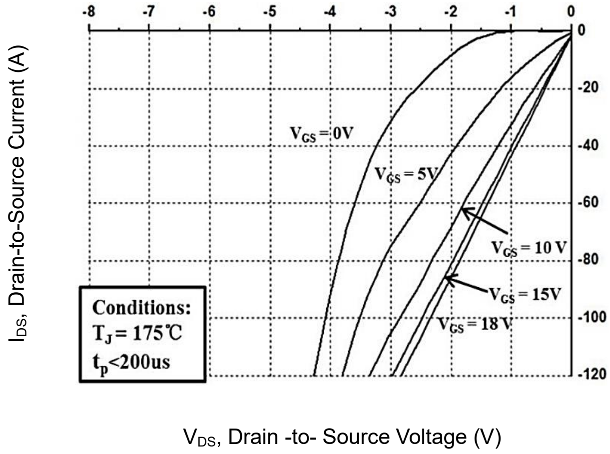
Body Diode Characteristics



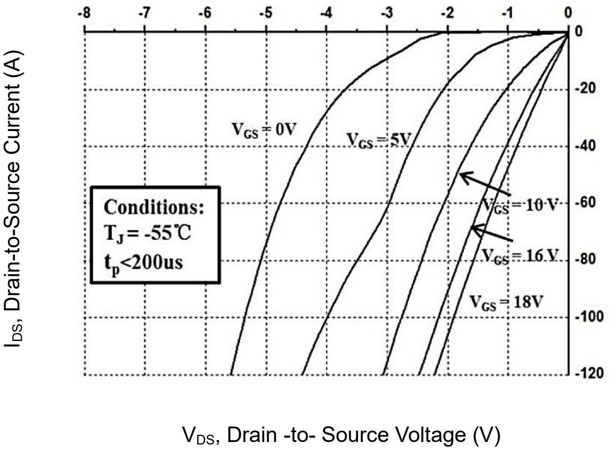
3rd Quadrant Characteristics



3rd Quadrant Characteristics

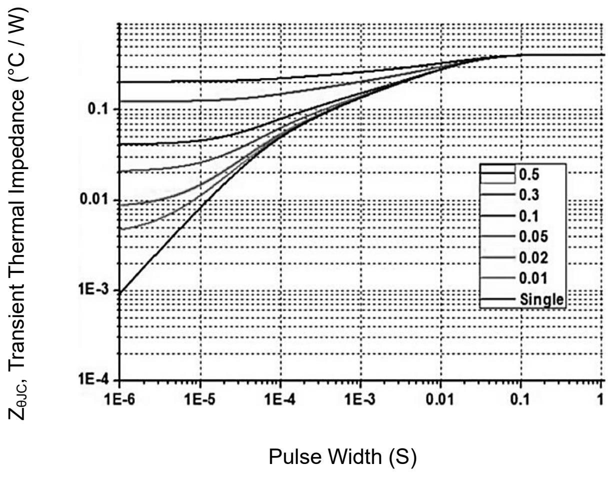


3rd Quadrant Characteristics

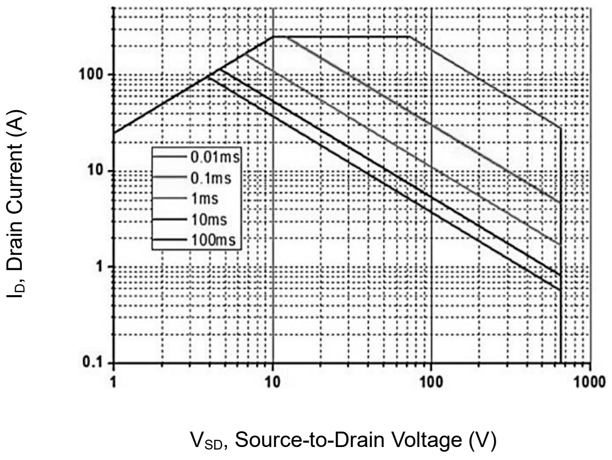


CHARACTERISTIC CURVES

Transient Thermal Impedance



Safe Operating Area



Output Capacitor Stored Energy