

Silicon Carbide MOSFET

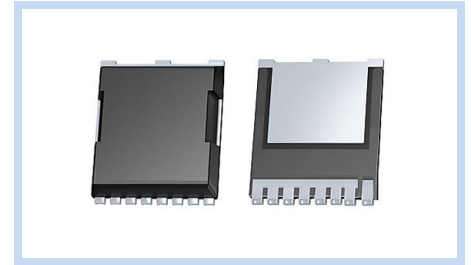
N-Channel 650V 52A TOLL

MFTC65N52TOLL

MERITEK

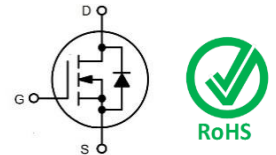
FEATURE

- $R_{DS(ON)} < 52m\Omega$ at $V_{GS}=18V$, $I_D=20A$
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low Reverse Recovery Charge
- Applications: DC-DC Converter, Server Power Supplier, EV Chargers, Solar PV Inverters, UPS



MECHANICAL DATA

- Case: TOLL Package
- Terminals: Solderable per MIL-STD-750, Method 2026

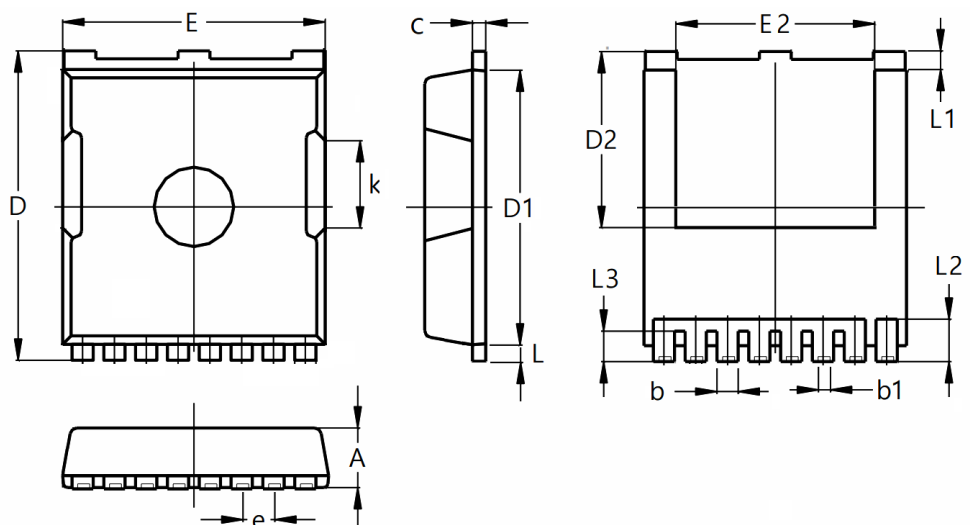


MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{GS}=0V$, $I_D=100\mu A$	V_{DS}	650 V
Gate-Source Voltage	Absolute Maximum Values	V_{GS}	-8/+22 V
	Recommended Operational Values		-4/+18 V
Continuous Drain Current	$V_{GS}=18V$, $T_C=25^\circ C$	I_D	52 A
	$V_{GS}=18V$, $T_C=100^\circ C$		37 A
Power Dissipation	$T_C=25^\circ C$	P_D	176 W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.85 °C / W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-40 to 175 °C

DIMENSIONS

TOLL	Min(mm)	Max(mm)
A	2.2	2.4
b	0.7	0.9
b1	0.35	0.45
C	0.4	0.65
D	11.55	11.9
D1	10.4	10.7
D2	6.8	7.2
E	9.7	9.9
E2	7.95	8.25
e	1.15	1.25
k	3.2	3.4
L	0.5	0.7
L1	0.6	0.8
L2	1.4	1.8
L3	1.05	1.35



Note: Pin Layout: Tab: Drain(D), 1: Gate(G),
2,3,4,5,6,7,8: Source(S)

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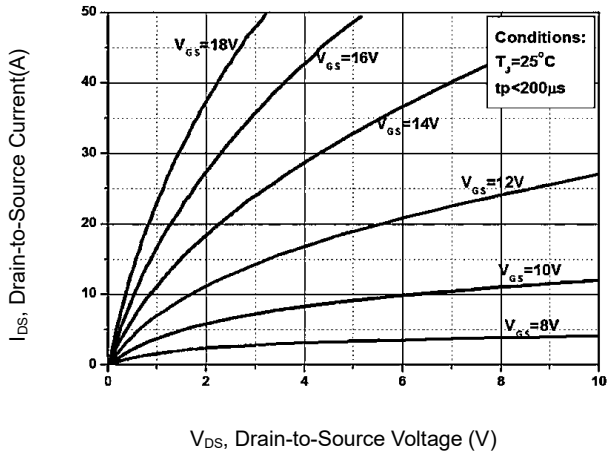
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ELECTRICAL CHARACTERISTICS

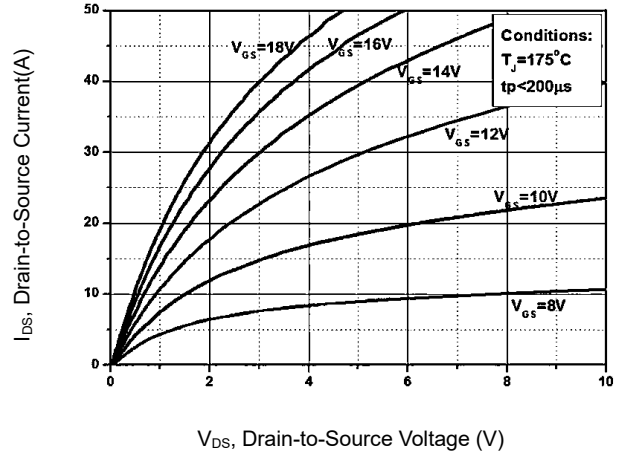
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	I_{DSS}	--	1	50	μA
Gate-Body Leakage Current	$V_{GS}=22V, V_{DS}=0V$	I_{GSS}	--	10	250	nA
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=18V, I_D=20A$	$R_{DS(ON)}$	--	40	52	m Ω
	$V_{GS}=18V, I_D=20A, T_J=175^\circ C$		--	50	--	
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=7.5mA$	$V_{GS(th)}$	1.8	2.6	4.3	V
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=400V, I_D=20A, V_{GS}= -4/+18V$	Q_g	--	101	--	nC
Gate-Source Charge		Q_{gs}	--	28	--	
Gate-Drain Charge		Q_{gd}	--	30	--	
Turn-On Delay Time	$V_{DS}=400V, I_D=20A, R_L=20\Omega$ $V_{GS}= -4/+18V, R_{GEN}=2.5\Omega,$	$T_{d(on)}$	--	13	--	nS
Rise Time		T_r	--	14	--	
Turn-Off Delay Time		$T_{d(off)}$	--	27	--	
Fall Time		T_f	--	8	--	
Turn-On Switching Loss	$V_{DS}=400V, I_D=20A, L=100\mu H$	E_{ON}	--	160	--	μJ
Turn-Off Switching Loss	$V_{GS}= -4/+18V, R_{GEN}=2.5\Omega,$	E_{OFF}	--	45	--	
Input Capacitance	$V_{DS}=400V, V_{GS}=0V, V_{AC}=25mV$ $f=1MHz$	C_{iss}	--	1500	--	pF
Output Capacitance		C_{oss}	--	135	--	
Reverse Transfer Capacitance		C_{rss}	--	15	--	
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Diode Forward Voltage	$V_{GS}= -4V, I_{SD}=10A$	V_{SD}	--	4.2	--	V
	$V_{GS}= -4V, I_{SD}=10A, T_J=175^\circ C$		--	3.8	--	
Diode Forward Current - Continuous	$V_{GS}= -4V, T_C=25^\circ C$	I_S	--	--	29	A
Peak Reverse Recovery Current	$V_R=400V, I_{SD}=20A,$	I_{rm}	--	4	--	A
Reverse Recovery Time		T_{rr}	--	23	--	nS
Reverse Recovery Charge		Q_{rr}	--	80	--	nC

CHARACTERISTIC CURVES

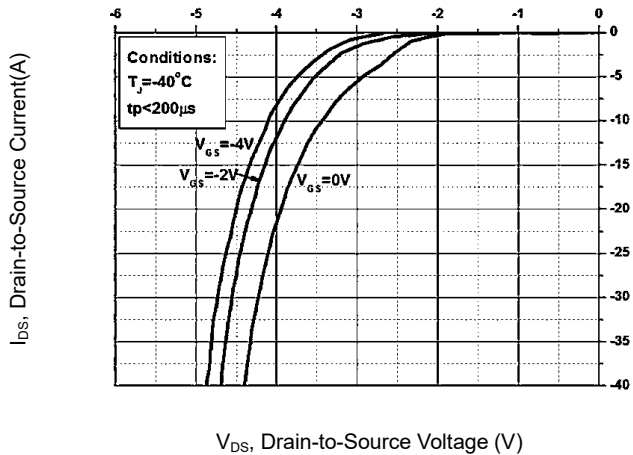
Output Characteristics



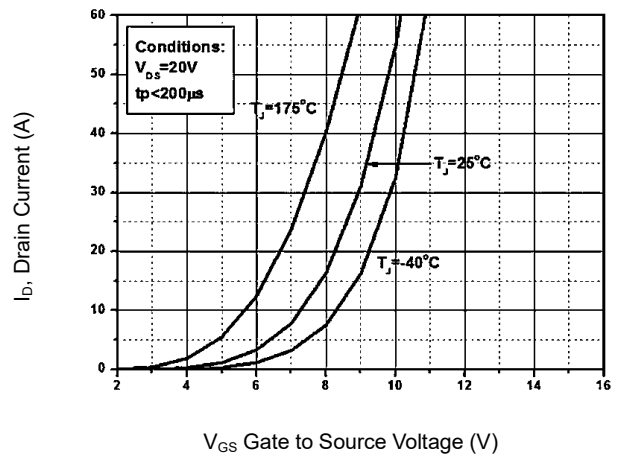
Output Characteristics



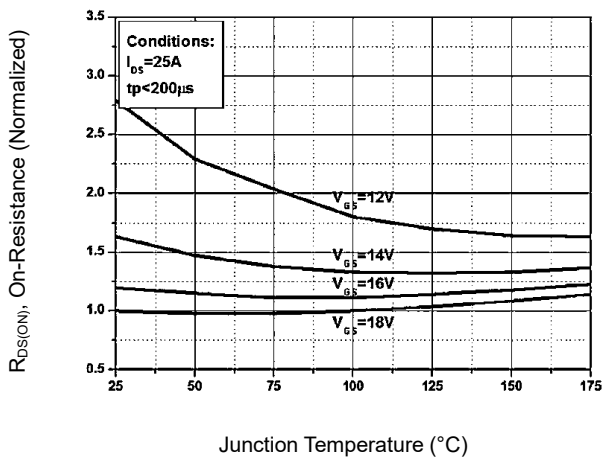
Output Characteristics



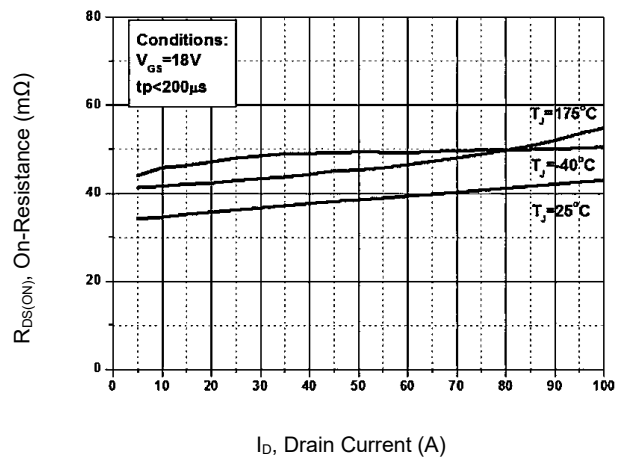
Transfer Characteristic



Normalized On-Resistance vs. Junction temperature

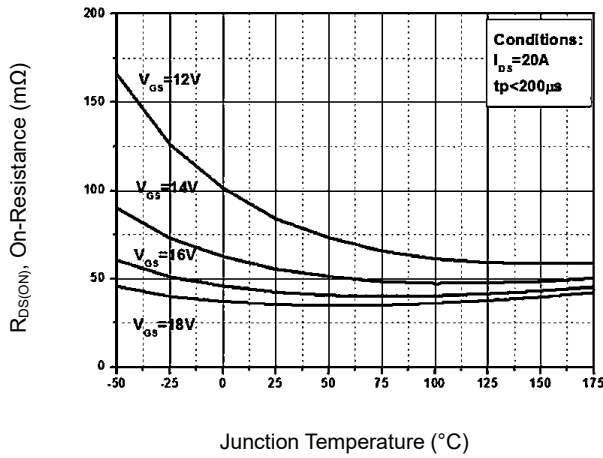


On-Resistance vs. Drain Current

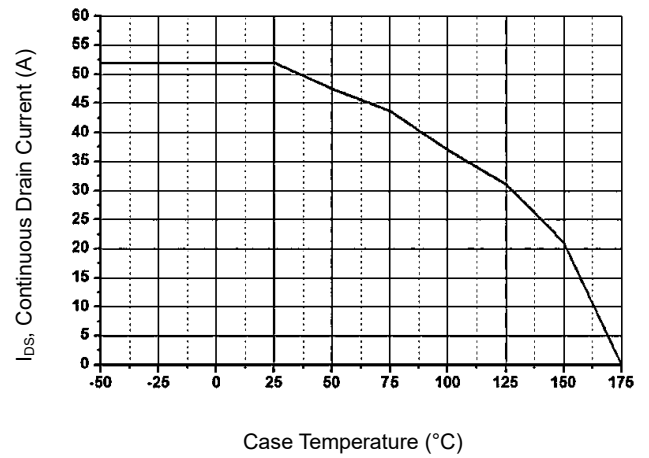


CHARACTERISTIC CURVES

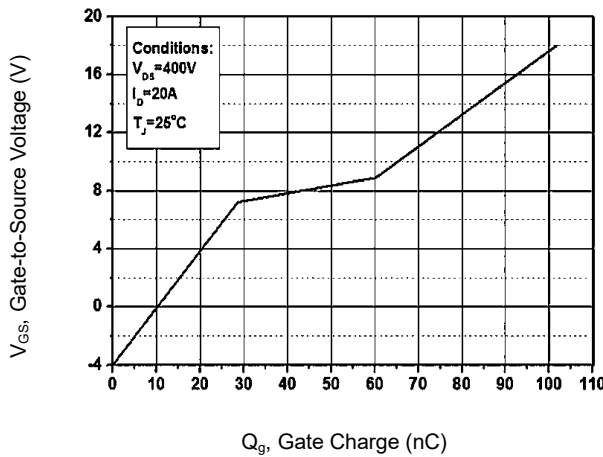
On-Resistance vs. Junction temperature for V_{GS}



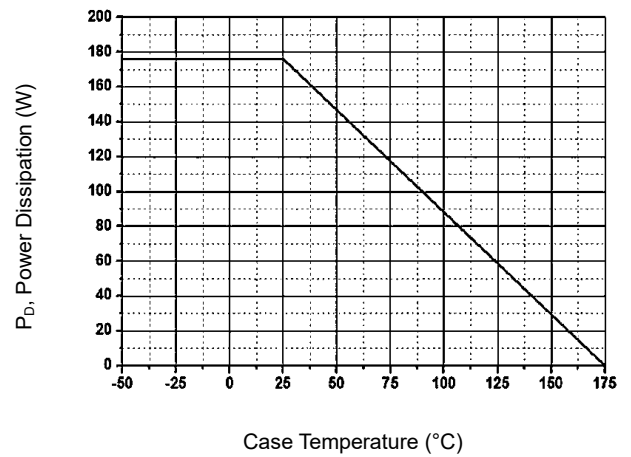
Continuous Drain Current vs. Case Temperature



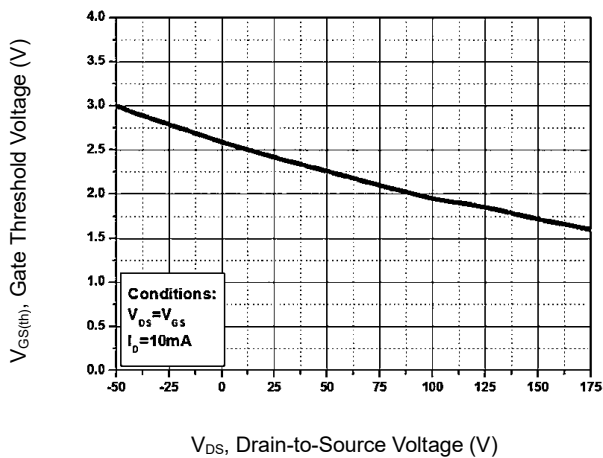
Gate-Charge Characteristics



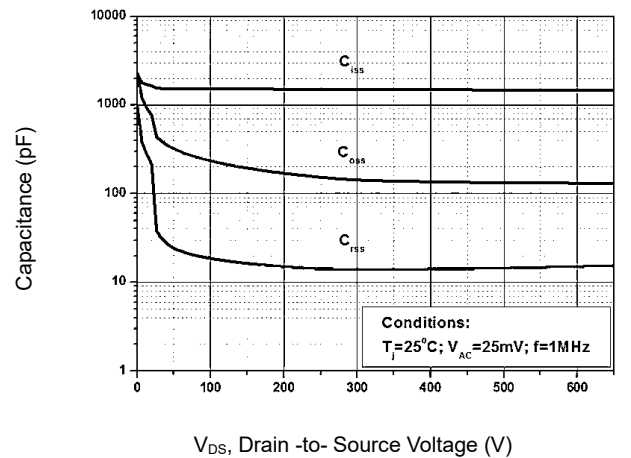
Maximum Power Dissipation Derating



Threshold Voltage vs. Junction temperature

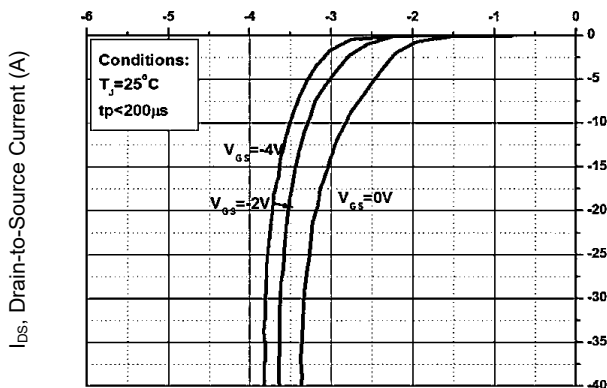


Capacitance vs. Drain-Source Voltage



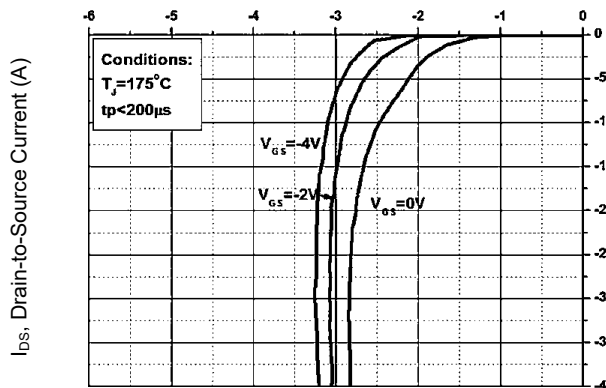
CHARACTERISTIC CURVES

Body Diode Characteristics



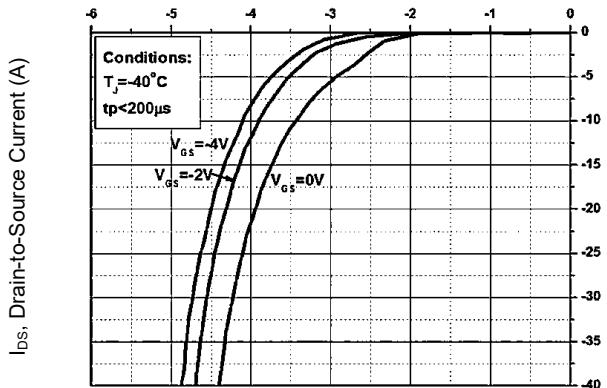
V_{DS} , Drain -to- Source Voltage (V)

Body Diode Characteristics



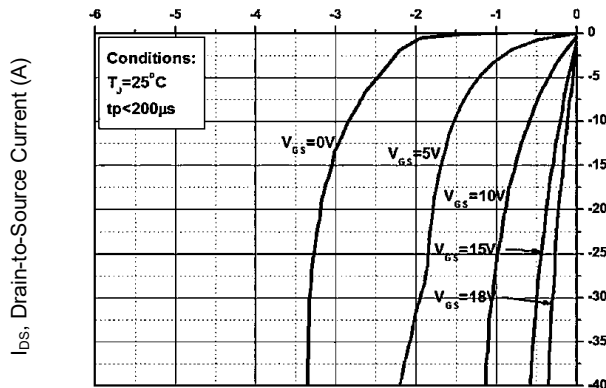
V_{DS} , Drain -to- Source Voltage (V)

Body Diode Characteristics



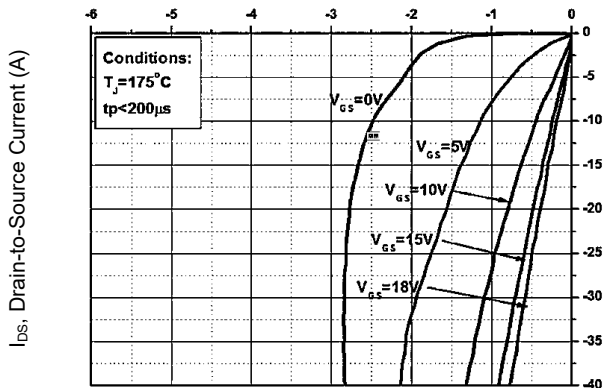
V_{DS} , Drain -to- Source Voltage (V)

3rd Quadrant Characteristics



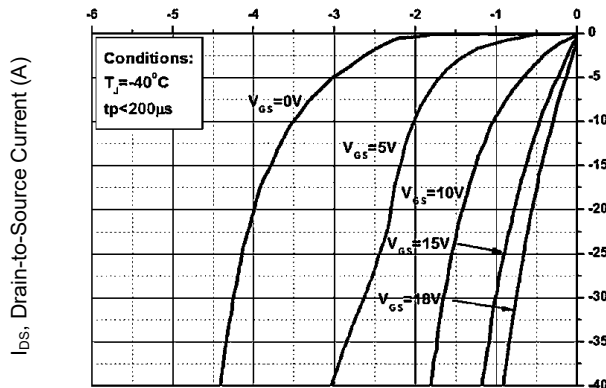
V_{DS} , Drain -to- Source Voltage (V)

3rd Quadrant Characteristics



V_{DS} , Drain -to- Source Voltage (V)

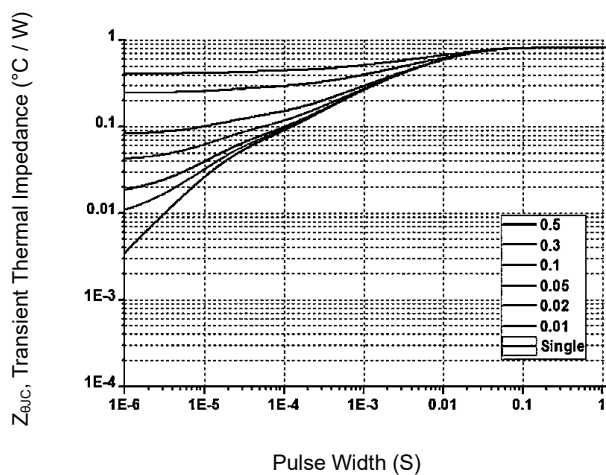
3rd Quadrant Characteristics



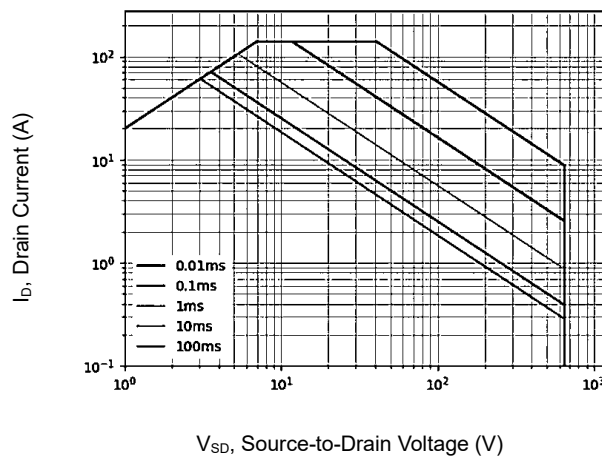
V_{DS} , Drain -to- Source Voltage (V)

CHARACTERISTIC CURVES

Transient Thermal Impedance



Safe Operating Area



Output Capacitor Stored Energy

