

Silicon Carbide MOSFET

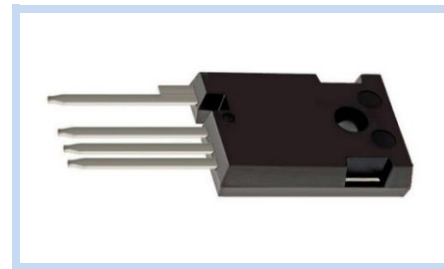
N-Channel 650V 92A TO-247-4

MFTC65N92T2474

MERITEK

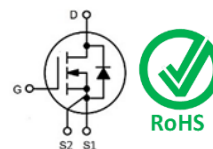
FEATURE

- $R_{DS(ON)} < 30m\Omega$ 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, EV Battery Chargers, Switching Mode Power Supplier, Renewable Energy



MECHANICAL DATA

- Case: TO-247-4 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

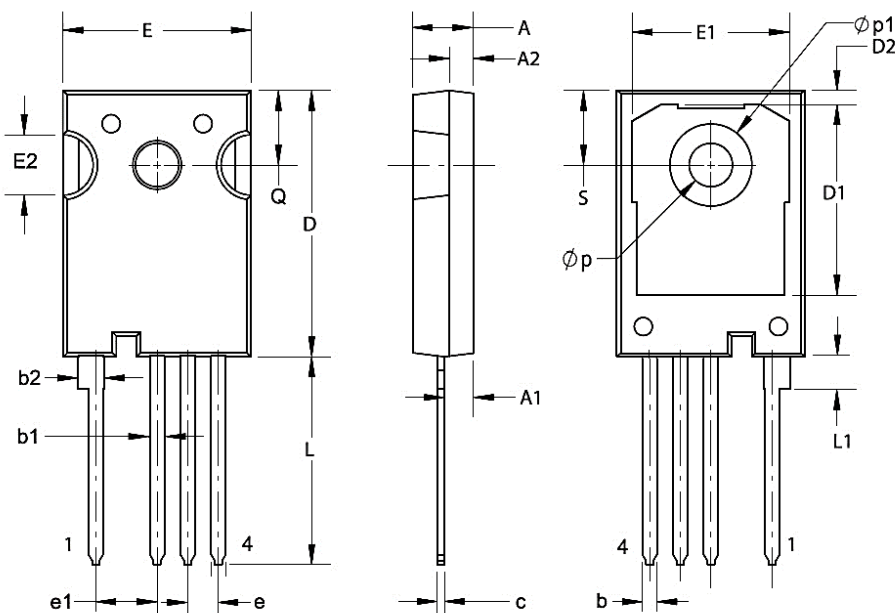


MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage	$V_{GS}=0V$, $I_D=100\mu A$	V_{DS}	650	V
Gate-Source Voltage	Dynamic ($f > 1Hz$)	V_{GS}	-8/ +22	V
	Static		-4/ +18	
Continuous Drain Current	$V_{GS}=18V$, $T_C=25^\circ C$	I_D	92	A
	$V_{GS}=18V$, $T_C=100^\circ C$		64	
Pulsed Drain Current		I_{DM}	257	A
Power Dissipation	$T_C=25^\circ C$	P_D	312	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	0.48	$^\circ C / W$
Operating Junction and Storage Temperature Range		T_J , T_{STG}	-55 to 175	$^\circ C$

DIMENSIONS

TO-247-4	Min (mm)	Max (mm)
A	4.80	5.25
A1	2.25	2.45
A2	1.85	2.15
b	1.05	1.35
b1	1.00	1.60
b2	2.35	2.95
c	0.50	0.70
D	23.34	22.74
D1	16.00	17.00
D2	0.97	1.37
e	2.34	2.74
e1	4.88	5.28
E	15.60	16.00
E1	13.50	14.50
E2	4.80	5.20
L	18.08	18.68
L1	2.38	2.78
p	3.50	3.70
p1	6.60	7.00
Q	6.00	6.30
S	6.00	6.30



Note: 1:Drain(D), 2:Source(S2), 3:Source(S1), 4:Gate(G)

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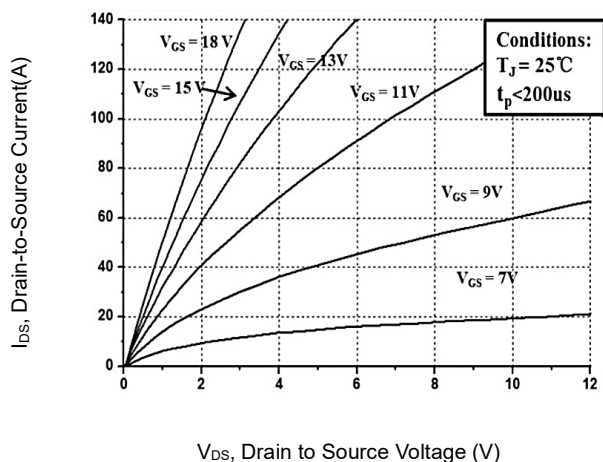
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ELECTRICAL CHARACTERISTICS

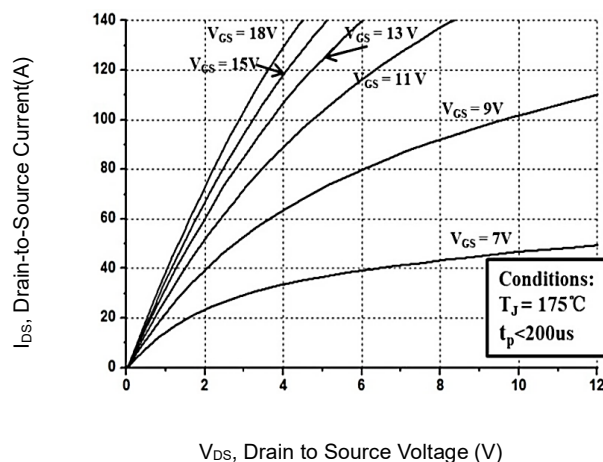
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	$V_{DS}=650V, V_{GS}=0V$	I_{DSS}	--	1	100	μA
Gate-Body Leakage Current, Forward	$V_{GS}=22V, V_{DS}=0V$	I_{GSSF}	--	10	250	nA
Gate-Body 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	m Ω
	$V_{GS}=18V, I_D=50A, T_J=175^\circ C$		--	28	--	
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=15mA$	$V_{GS(th)}$	1.9	2.6	4.0	V
	$V_{GS}=V_{DS}, I_D=15mA, T_J=175^\circ C$		--	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	$V_{DS}=400V, I_D=40A, R_L=20\Omega$ $V_{GS}= -4/+18V, R_{GEN}=2.5\Omega,$	$T_{d(on)}$	--	17	--	ns
Rise Time		T_r	--	15	--	
Turn-Off Delay Time		$T_{d(off)}$	--	65	--	
Fall Time		T_f	--	14	--	
Turn-On Switching Loss	$V_{DS}=400V, I_D=40A, L=100\mu H$ $V_{GS}= -4/+18V, R_{GEN}=2.5\Omega,$	E_{ON}	--	0.52	--	mJ
Turn-Off Switching Loss		E_{OFF}	--	0.70	--	
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
	$V_{GS}= -4V, I_{SD}=25A, T_J=175^\circ C$		--	3.9	--	
Diode Forward Current - Continuous	--	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

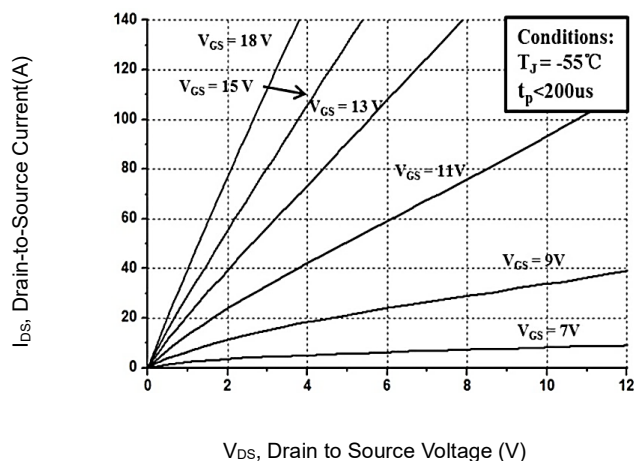
Output Characteristics



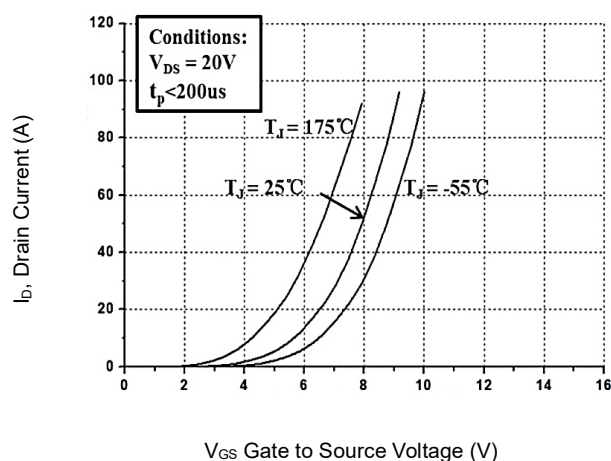
Output Characteristics



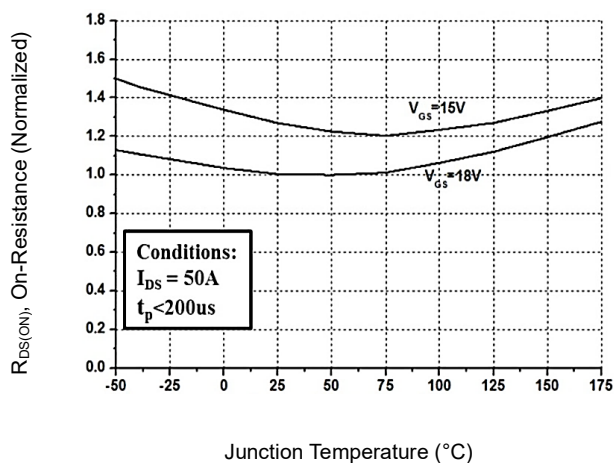
Output Characteristics



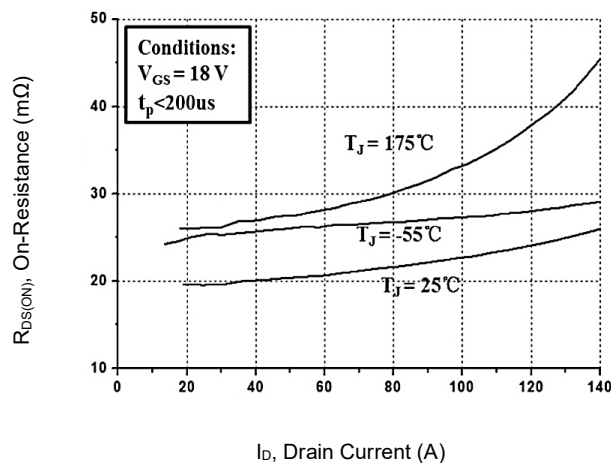
Transfer Characteristic



Normalized On-Resistance vs. Junction temperature

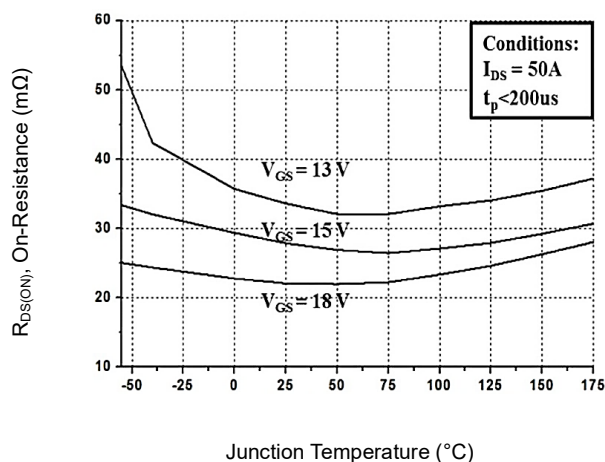


On-Resistance vs. Drain Current

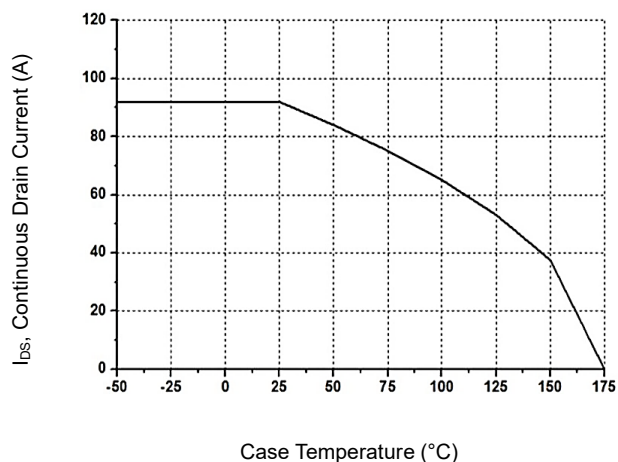


CHARACTERISTIC CURVES

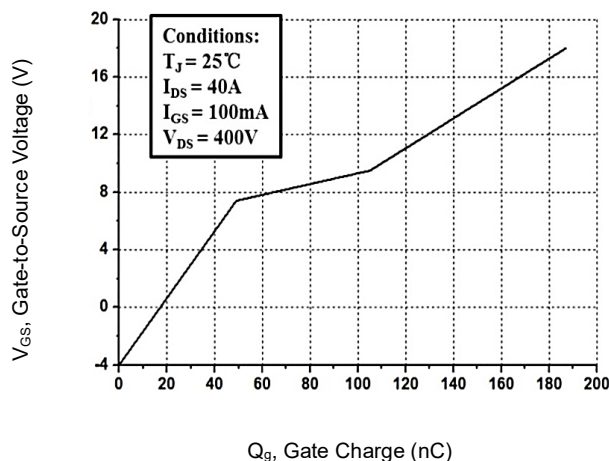
On-Resistance vs. Junction temperature for V_{GS}



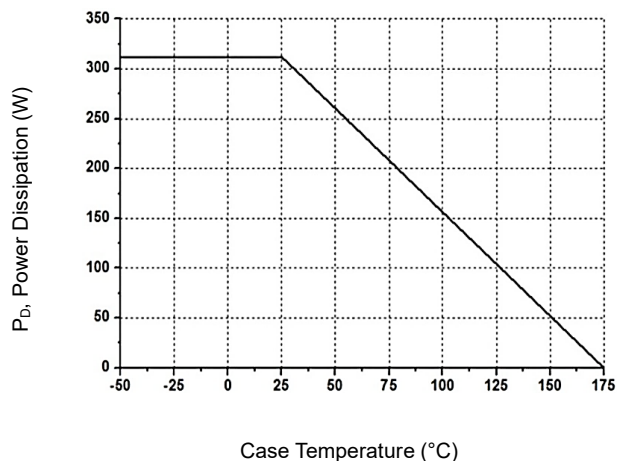
Continuous Drain Current vs. Case Temperature



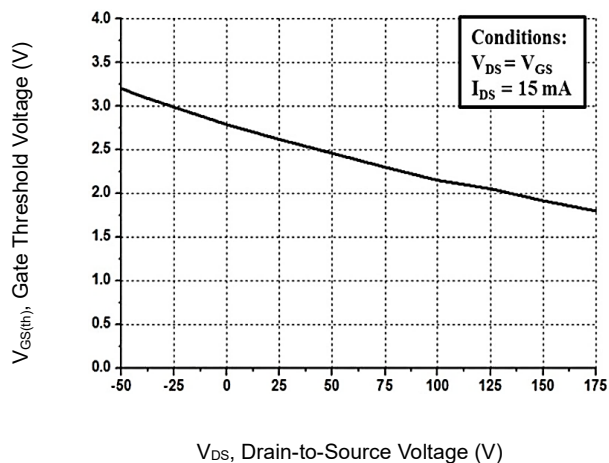
Gate-Charge Characteristics



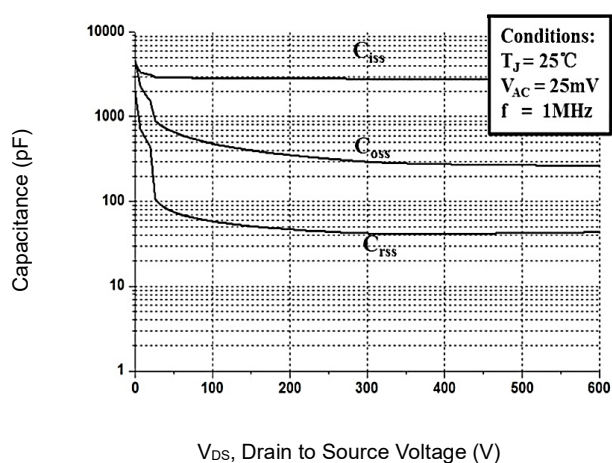
Maximum Power Dissipation Derating



Threshold Voltage vs. Junction temperature

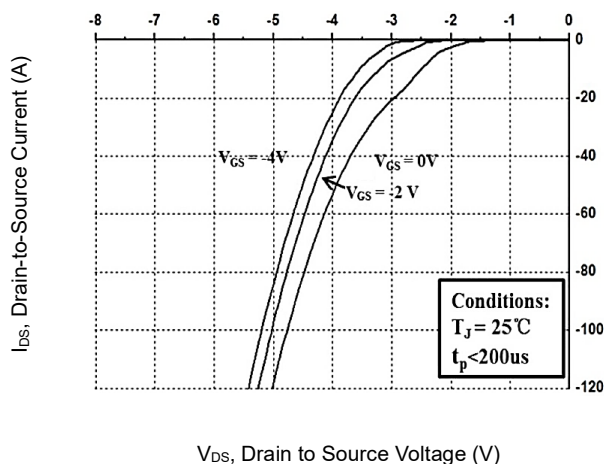


Capacitance vs. Drain-Source Voltage

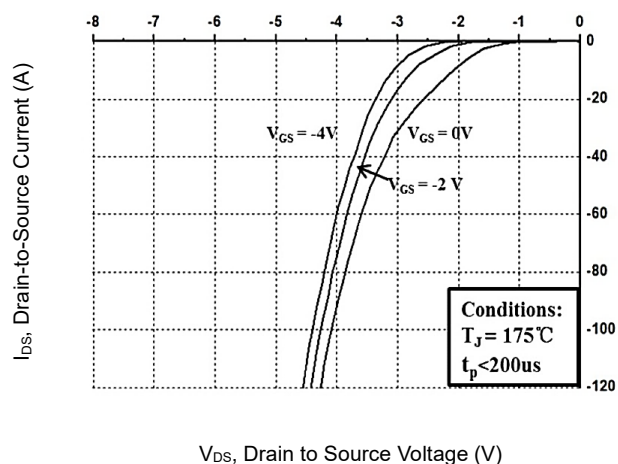


CHARACTERISTIC CURVES

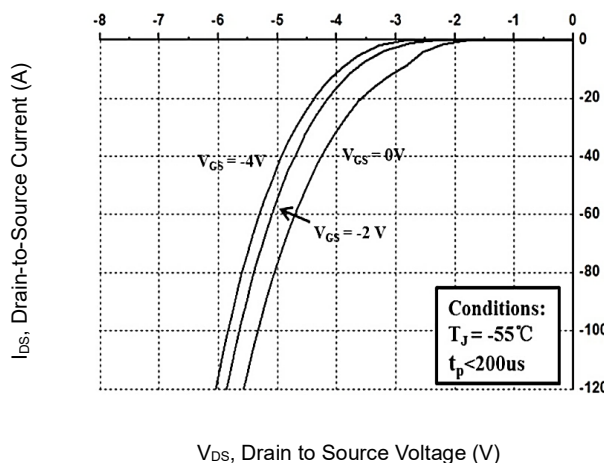
Body Diode Characteristics



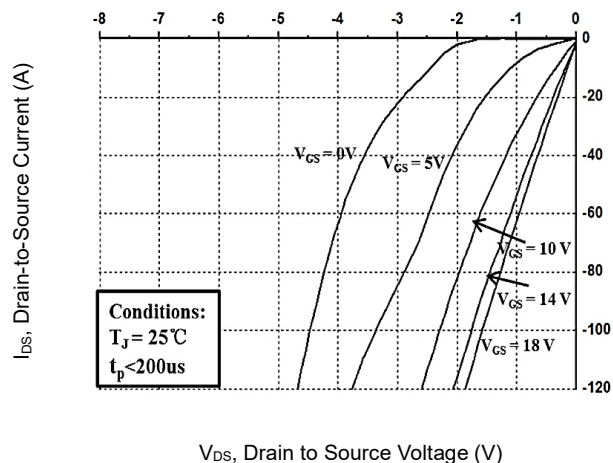
Body Diode Characteristics



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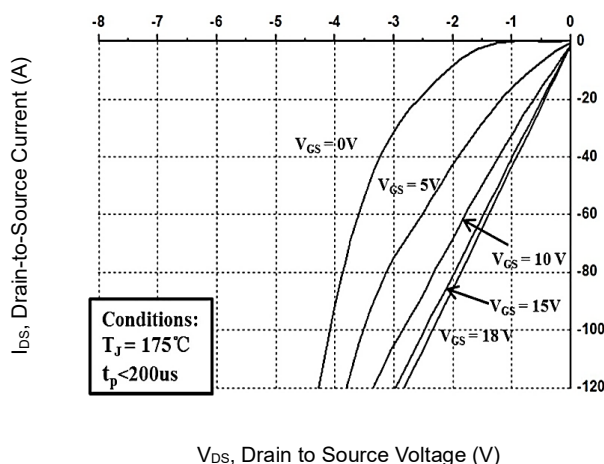
3rd Quadrant Characteristics



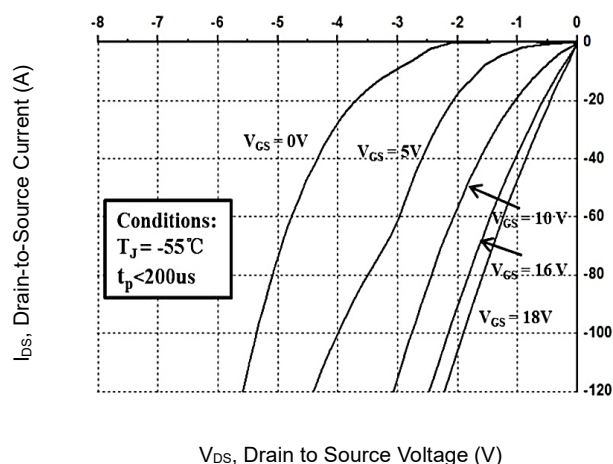
V_{DS} , Drain to Source Voltage (V)

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3rd Quadrant Characteristics



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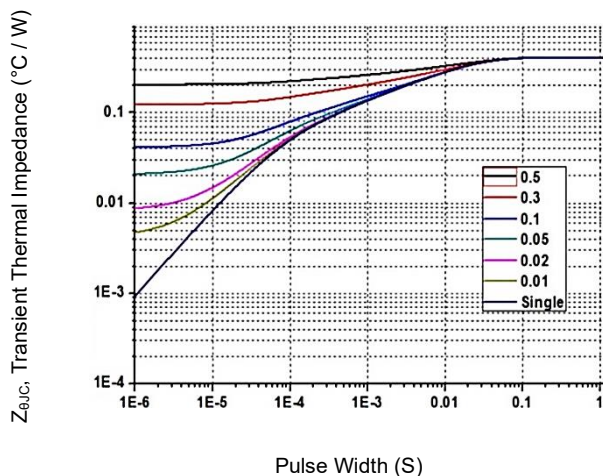


V_{DS} , Drain to Source Voltage (V)

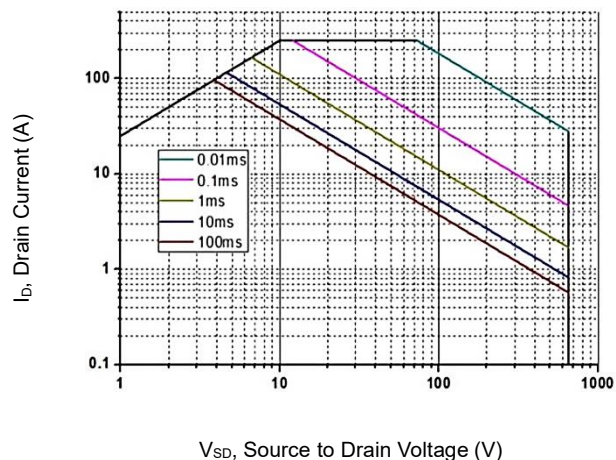
V_{DS} , Drain to Source Voltage (V)

CHARACTERISTIC CURVES

Transient Thermal Impedance



Safe Operating Area



Output Capacitor Stored Energy

