

N-Channel Gallium Nitride FET

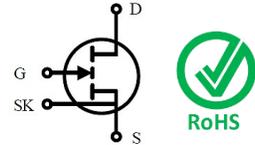
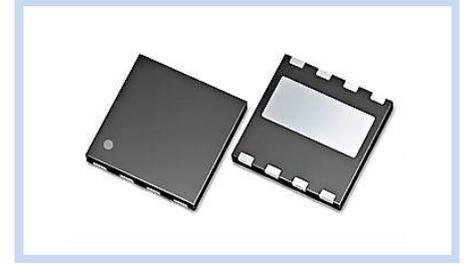
650V 29A 188W DFN8x8

MFTG65N29D88

MERITEK

FEATURE

- $R_{DS(ON)} < 80m\Omega$ at $V_{GS}=6V$, $I_D=8A$
- Enhancement Mode Transistor-Normally Off Power Switch
- Low Gate Charge, Low Output charge
- Ultra High Switching Frequency
- No Reverse-Recovery Charge
- ESD Safeguard
- Applications: AC-DC & DC-DC Converter, Totem Pole PFC, Fast Battery Charging, etc.

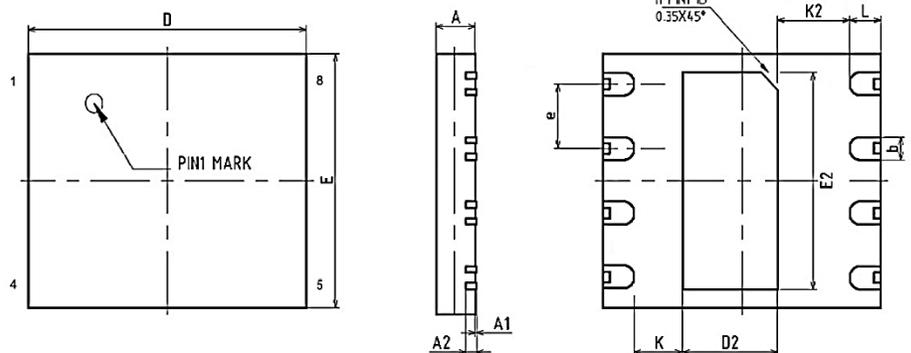


MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Maximum Drain-Source Voltage	$V_{GS}=0V$ $V_{DS, max}$	650	V
Transient Drain-Source Voltage	$V_{GS}=0V$ $V_{DS, transient}$	800	V
Pulse Drain-Source Voltage	$T_J=25^\circ C$, Total time<10hrs	750	V
	$T_J=125^\circ C$, Total time<1hrs		
Continuous Gate-Source Voltage	V_{GS}	-6 to 7	V
Pulse Gate-Source Voltage	$t= 50ns$, $f=100kHz$, open drain	$V_{GS, pulse}$	-20 to 10
Drain Current – Continuous	$T_C=25^\circ C$	I_D	29
Drain Current – Pulsed	$V_{GS} = 6V$, $T_C=25^\circ C$, $t= 10\mu s$	I_{DM}	58
	$V_{GS} = 6V$, $T_C=125^\circ C$, $t= 10\mu s$		29
Power Dissipation	$T_C=25^\circ C$	P_D	188
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	33.6	$^\circ C / W$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.52	$^\circ C / W$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$
Soldering Temperature	T_{sold}	260	$^\circ C$

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	0.80	1.00
A1	0.00	0.05
A2	0.203 REF	
b	0.92	1.05
D	8.00 BSC	
D2	3.10	3.30
E	8.00 BSC	
E2	6.84	7.04
e	2.00 BSC	
L	0.40	0.60
K	0.90	1.10
K2	2.70	2.90



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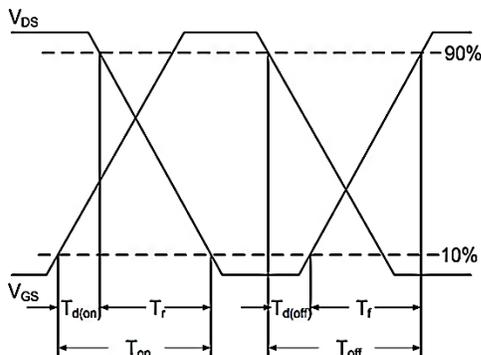
ELECTRICAL CHARACTERISTICS

Static Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Leakage Current	$V_{DS}=650V, V_{GS}=0V, T_J=25^{\circ}C$	I_{DSS}	--	5	65	μA
	$V_{DS}=650V, V_{GS}=0V, T_J=150^{\circ}C$		--	13	390	
Gate-Source Leakage Current	$V_{GS}=6V, V_{DS}=0V$	I_{GSS}	--	163	--	μA
Static Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=6V, I_D=8A, T_J=25^{\circ}C$	$R_{DS(ON)}$	--	60	80	m Ω
	$V_{GS}=6V, I_D=8A, T_J=150^{\circ}C$		--	135	--	
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=30.7mA, T_J=25^{\circ}C$	$V_{GS(th)}$	1.2	1.7	2.5	V
	$V_{GS}=V_{DS}, I_D=30.7mA, T_J=150^{\circ}C$		--	1.6	--	
Gate Resistance	f=5MHz, open drain	R_G	--	3	--	Ω
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=400V, I_D=8A, V_{GS}=0$ to 6V	Q_g	--	6.2	--	nC
Gate-Source Charge		Q_{gs}	--	0.5	--	
Gate-Drain Charge		Q_{gd}	--	2.2	--	
Gate Plateau Voltage	$V_{DS}=400V, I_D=8A$	V_{Plat}	--	2.2	--	V
Turn-On Delay Time	$V_{DS}=400V, I_D=16A, L=318\mu H$ $V_{GS}=6V, R_{ON}=10\Omega, R_{OFF}=2\Omega$	$T_{d(on)}$	--	3	--	ns
Rise Time		T_r	--	4	--	
Turn-Off Delay Time		$T_{d(off)}$	--	5	--	
Fall Time		T_f	--	4	--	
Input Capacitance	$V_{DS}=400V, V_{GS}=0V,$ f=100KHz	C_{iss}	--	225	--	pF
Output Capacitance		C_{oss}	--	70	--	
Reverse Transfer Capacitance		C_{rss}	--	0.5	--	
Effective Output Capacitance, Energy Related		$C_{o(er)}$	--	105	--	
Effective Output Capacitance, Time Related		$C_{o(tr)}$	--	150	--	
Output Charge	$V_{DS}=0$ to 400V, $V_{GS}=0V$	Q_{OSS}	--	60	--	nC
Reverse Conduction Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Source-Darin Reverse Voltage	$V_{GS}=0V, I_S=8A$	V_{SD}	--	2.3	--	V
Pulsed Current, Reverse	$V_{GS}=6V, t_{PULSE}=10\mu s$	$I_{S,Pulse}$	--	--	58	A
Peak Reverse Recovery Current	--	I_{rrm}	--	0	--	A
Reverse Recovery Time	--	T_{rr}	--	0	--	ns
Reverse Recovery Charge	$V_{DS}=400V, I_S=8A$	Q_{rr}	--	0	--	nC

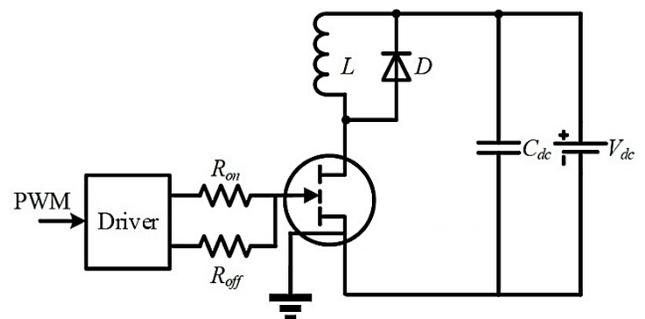
Note:

- $V_{DS,transient}$ is intended for non-repetitive events, $t_{PULSE}<200\mu s$
- $V_{DS,pulse}$ is intended for repetitive pulse, $t_{PULSE}<100ns$
- $C_{o(er)}$ is the fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V.
- $C_{o(tr)}$ is the fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V.
- Guaranteed by design, not subject to production testing.
- MSL3

Switching Time Waveform



Switching Test Circuit



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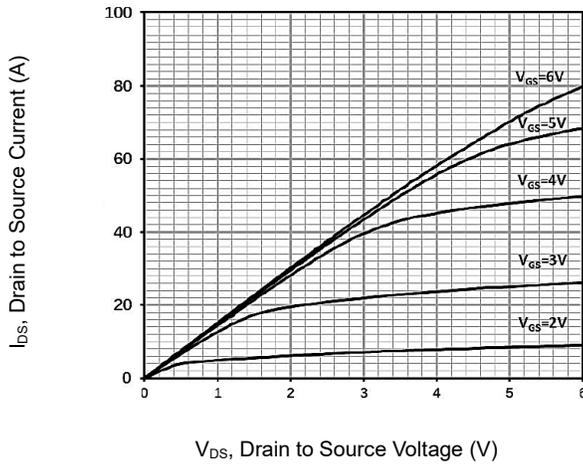
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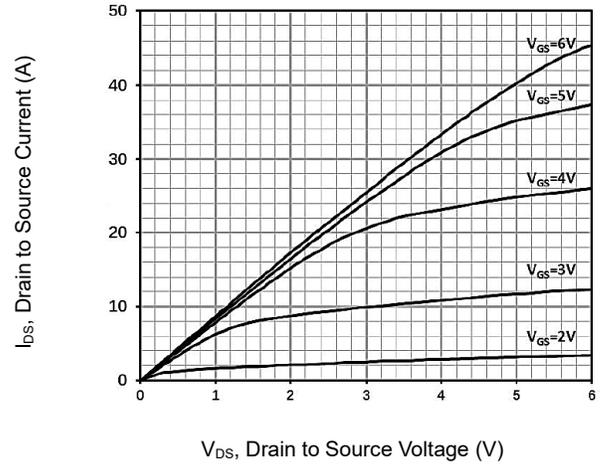
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CHARACTERISTIC CURVES

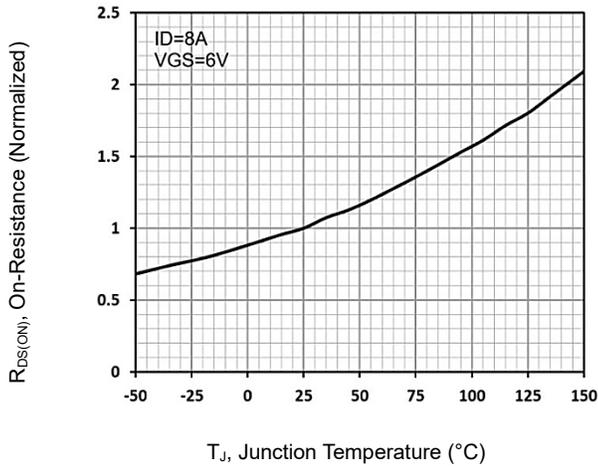
Output Characteristics at $T_J=25^\circ\text{C}$



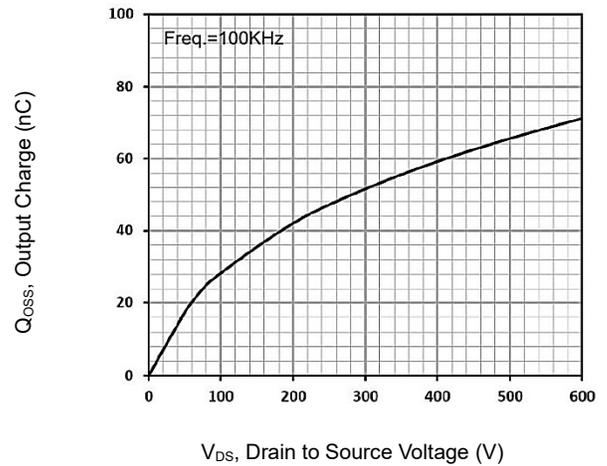
Output Characteristics at $T_J=125^\circ\text{C}$



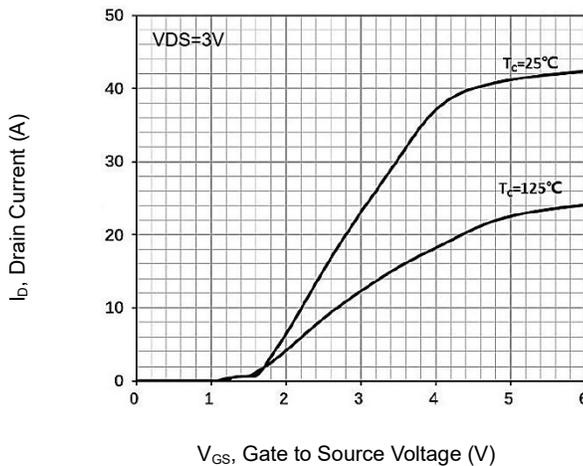
Normalized On-Resistance vs. Junction temperature



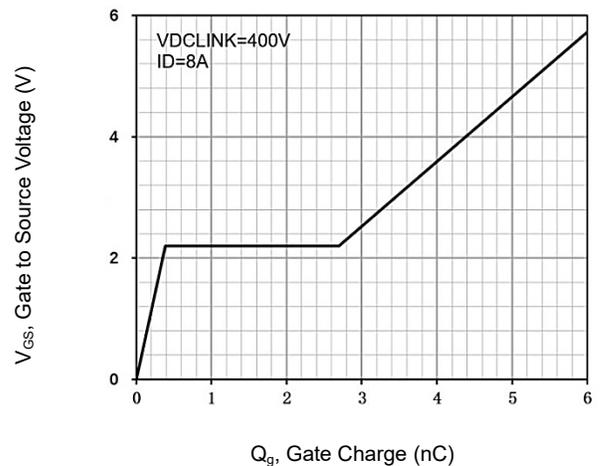
Output-Charge Characteristics



Transfer Characteristic



Gate-Charge Characteristics



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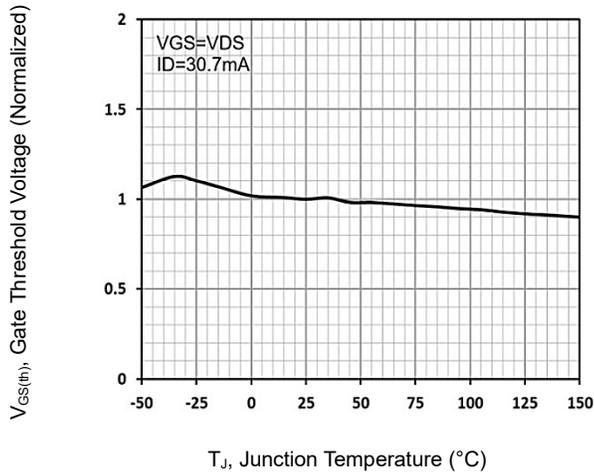
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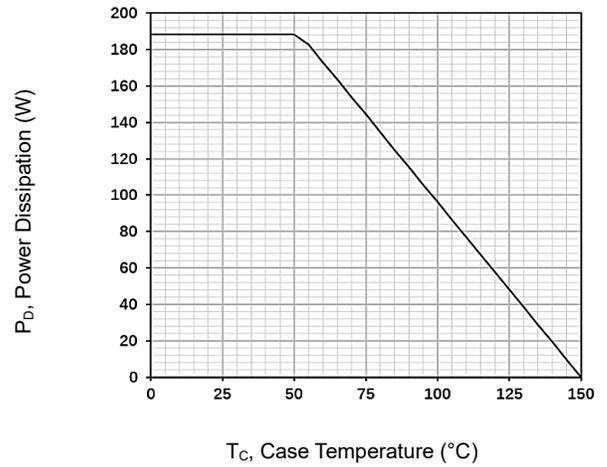
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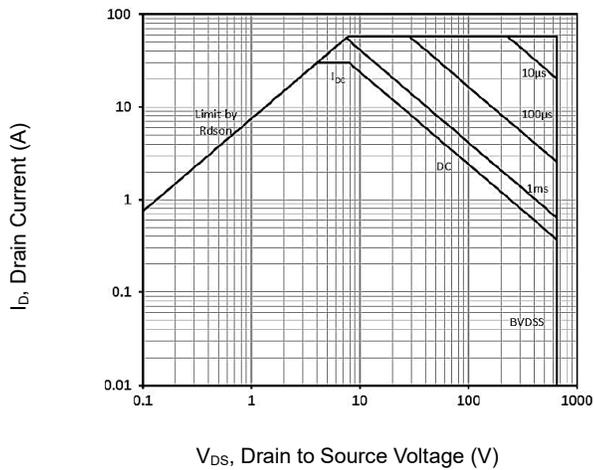
Normalized Threshold Voltage vs. Junction Temperature



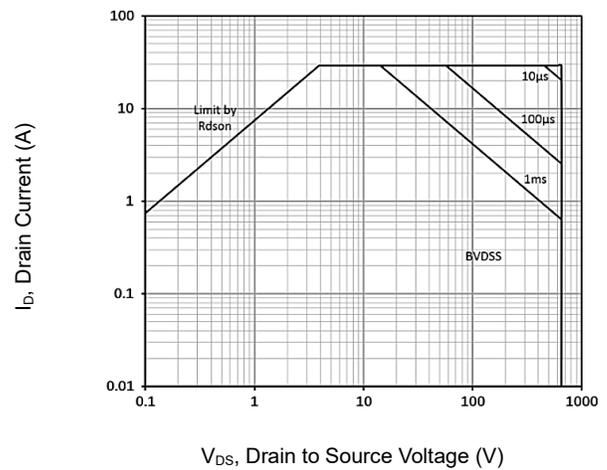
Power Dissipation Derating



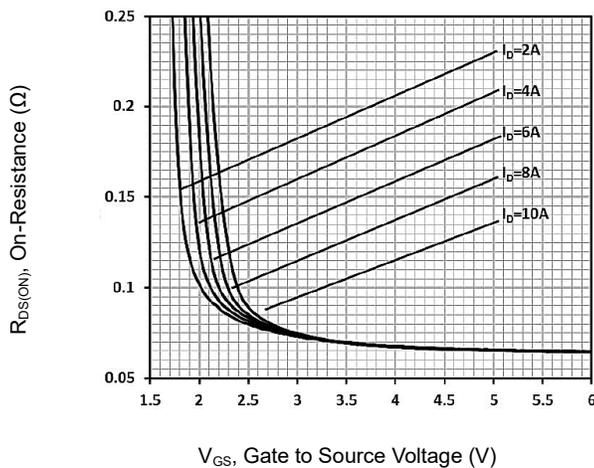
Safe Operating Area at $T_c=25^{\circ}C$



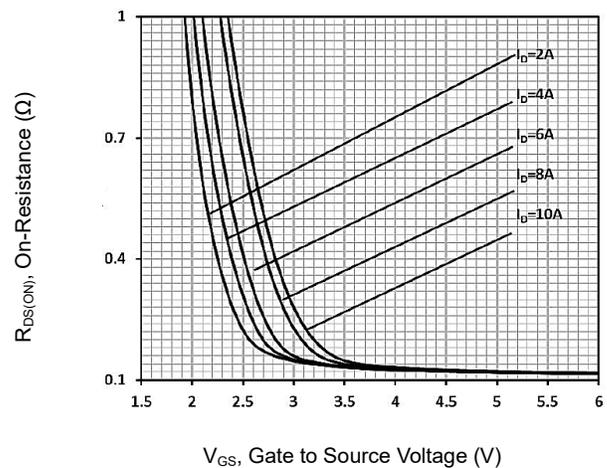
Safe Operating Area at $T_c=125^{\circ}C$



On-Resistance vs. Gate-Source Voltage at $T_J=25^{\circ}C$



On-Resistance vs. Gate-Source Voltage at $T_J=125^{\circ}C$



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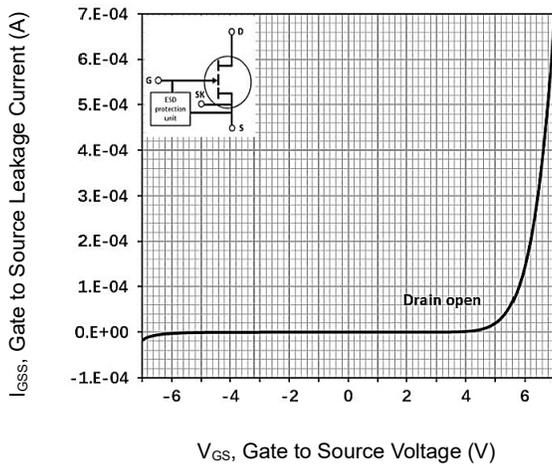
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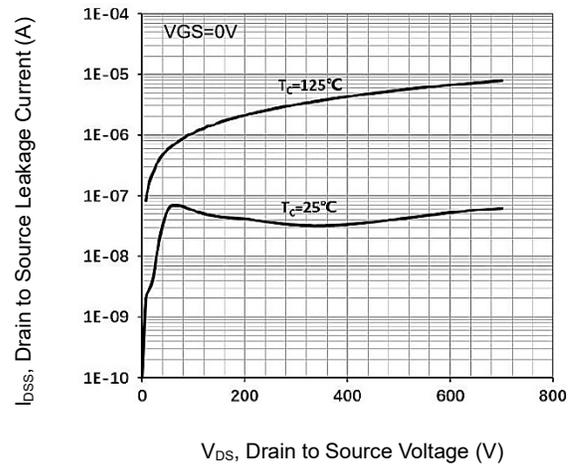
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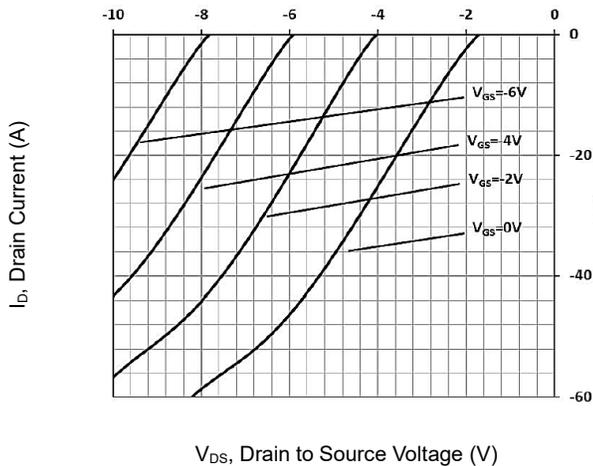
Gate to Source Leakage Characteristics



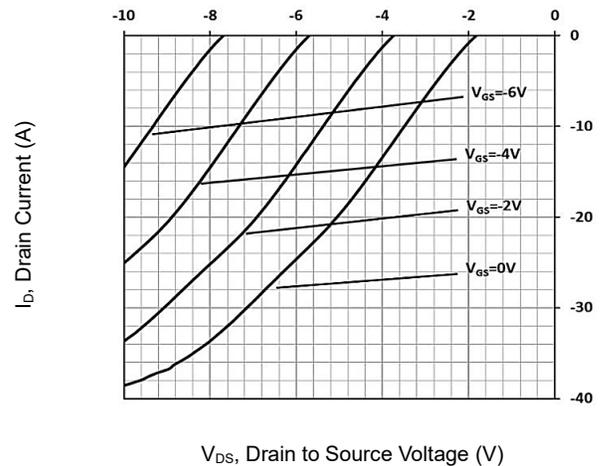
Drain to Source Leakage Characteristics



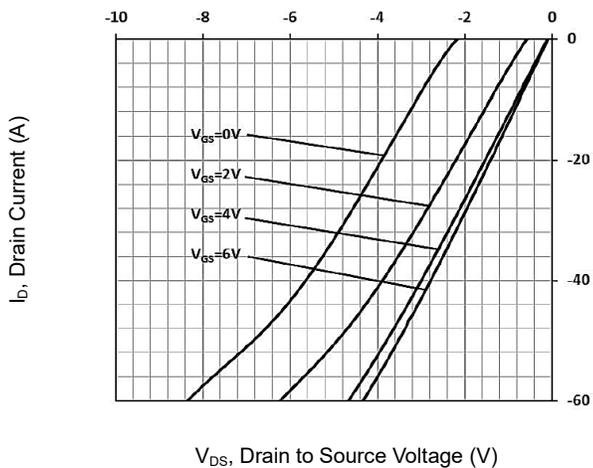
Reverse Characteristics at $T_J=25^\circ\text{C}$



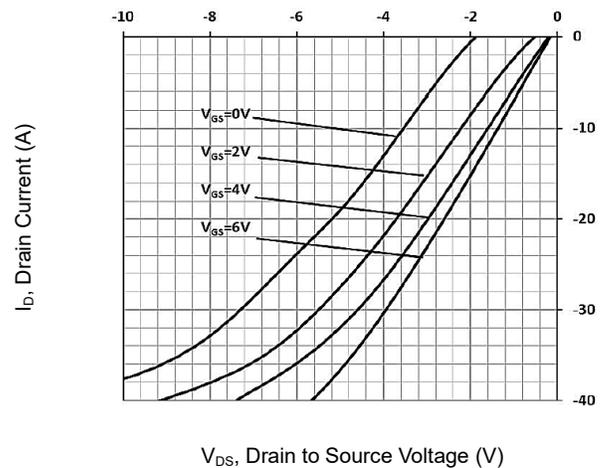
Reverse Characteristics at $T_J=125^\circ\text{C}$



Reverse Characteristics at $T_J=25^\circ\text{C}$



Reverse Characteristics at $T_J=125^\circ\text{C}$



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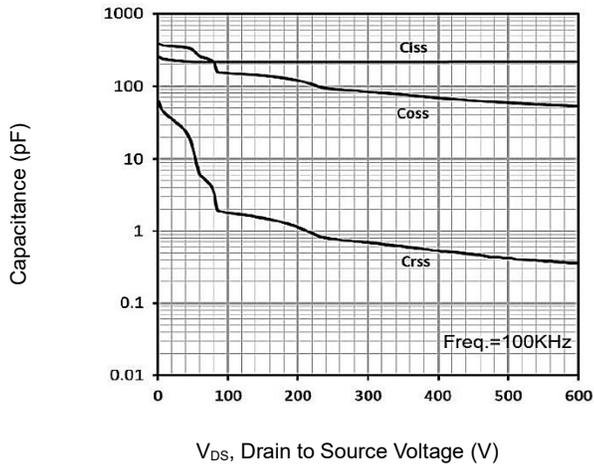
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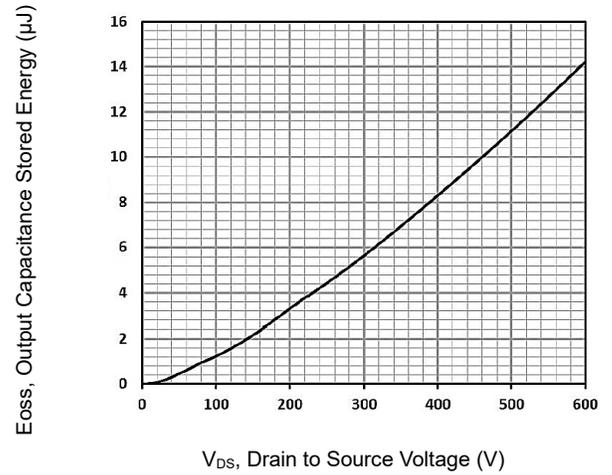
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CHARACTERISTIC CURVES

Capacitance



Output Capacitance Stored Energy



Maximum Transient Thermal Impedance

