

■ PRODUCT CHARACTERISTICS

V_{DSS}	40V	V_{DSS}	-40V
$R_{DS(on)typ}(V_{GS}=10V)$	15m Ω	$R_{DS(on)typ}(V_{GS}=-10V)$	31m Ω
$R_{DS(on)typ}(V_{GS}=4.5V)$	22m Ω	$R_{DS(on)typ}(V_{GS}=-4.5V)$	38m Ω
I_D	15A	I_D	-15A

■ FEATURES

- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

■ APPLICATION

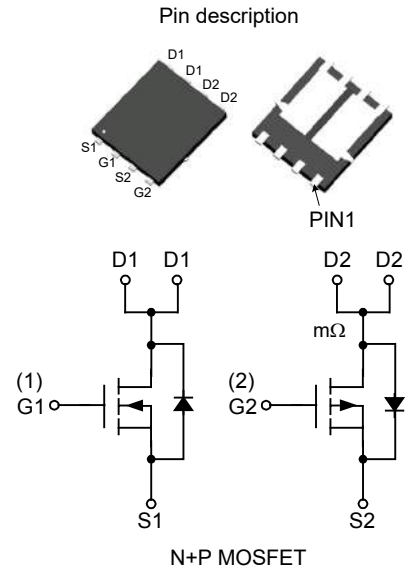
- Battery Protection
- Load Switch
- Power Management

■ ORDER INFORMATION

Order codes		Package	Packing
Halogen-free	Halogen		
N/A	MOT4648J	PDFN3X3	5000Pieces/Reel

■ ABSOLUTE MAIMUM RATINGS (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	N-channel	P-channel	Unit.	
Drain-to-Source Voltage	V_{DS}	40	-40	V	
Gate-to-Source Voltage	V_{GS}	± 20	± 20	V	
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	15	-15	A
	$T_C = 100^\circ\text{C}$	I_D	9	-9	A
Pulsed Drain Current	I_{DM}	56	-56	A	
Single Pulsed Avalanche Energy	E_{AS}	20	20	mJ	
Power Dissipation	P_D	14	14	W	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	64	64	$^\circ\text{C/W}$	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	8.8	8.8	$^\circ\text{C/W}$	
Junction & Storage Temperature Range	T_J, T_{STG}	-55 to 150	-55 to 150	$^\circ\text{C}$	



■ N-ELECTRICAL CHARACTERISTICS (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit.
Off characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$	-	-	1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
On characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	1.5	2.5	V
Static Drain-Source ON-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 14\text{A}$	-	15	22	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$	-	20	30	$\text{m}\Omega$
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{V}, V_{DS} = 20\text{V}, f = 1\text{MHz}$	-	1061	-	pF
Output Capacitance	C_{oss}		-	74	-	pF
Reverse Transfer Capacitance	C_{rss}		-	62	-	pF
Total Gate Charge	Q_g	$V_{GS} = 0 \text{ to } 10\text{V}$ $V_{DD} = 20\text{V}, I_D = 5\text{A}$	-	23	-	nC
Gate Source Charge	Q_{gs}		-	3.5	-	nC
Gate Drain ("Miller") Charge	Q_{gd}		-	4	-	nC
Switching characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{V}, V_{DD} = 20\text{V}$ $I_D = 5\text{A}, R_{GEN} = 3\Omega$	-	6	-	ns
Turn-On Rise Time	t_r		-	6	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	24	-	ns
Turn-Off Fall Time	t_f		-	3	-	ns
Drain-source diode characteristics						
Drain to Source Diode Forward Current	I_S		-	-	14	A
Drain to Source Diode Forward Current	I_{SM}		-	-	56	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}, I_S = 14\text{A}$	-	-	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 5\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	10	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	5	-	nC

■ P-ELECTRICAL CHARACTERISTICS (@ $T_C = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit.
Off characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40\text{V}, V_{GS} = 0\text{V}$	-	-	-1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
On characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-1.2	-1.8	-2.3	V
Static Drain-Source ON-Resistance	$R_{DS(ON)}$	$V_{GS} = -10\text{V}, I_D = -5\text{A}$	-	31	40	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -3\text{A}$	-	38	49	$\text{m}\Omega$
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{V}, V_{DS} = -20\text{V}, f = 1\text{MHz}$	-	1117	-	pF
Output Capacitance	C_{oss}		-	89	-	pF
Reverse Transfer Capacitance	C_{rss}		-	74	-	pF
Total Gate Charge	Q_g	$V_{GS} = 0 \text{ to } -10\text{V}$ $V_{DD} = -20\text{V}, I_D = -5\text{A}$	-	22	-	nC
Gate Source Charge	Q_{gs}		-	4	-	nC
Gate Drain("Miller") Charge	Q_{gd}		-	4	-	nC
Switching characteristics						
Turn-On DelayTime	$t_{d(on)}$	$V_{GS} = -10\text{V}, V_{DD} = -20\text{V}$ $I_D = -5\text{A}, R_{GEN} = 3\Omega$	-	5	-	ns
Turn-On Rise Time	t_r		-	2	-	ns
Turn-Off DelayTime	$t_{d(off)}$		-	54	-	ns
Turn-Off Fall Time	t_f		-	25	-	ns
Drain-source diode characteristics						
Drain to Source Diode Forward Current	I_S		-	-	-14	A
Drain to Source Diode Forward Current	I_{SM}		-	-	-56	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}, I_S = -14\text{A}$	-	-	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -5\text{A}, di/dt = 100\text{A}/\mu\text{s}$	-	13	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	7	-	nC

■ N-TYPICAL CHARACTERISTICS

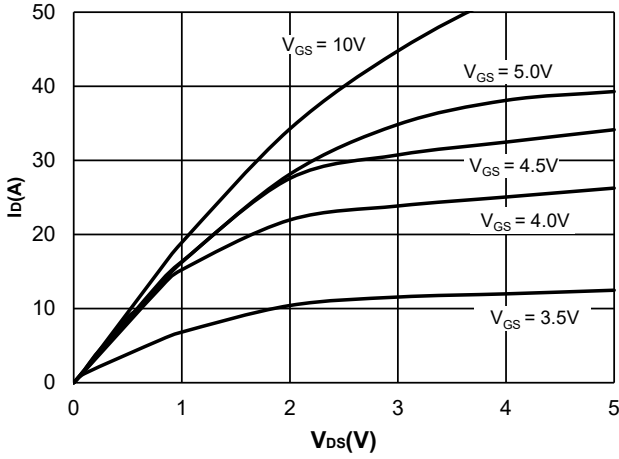


Figure 1: Output Characteristics

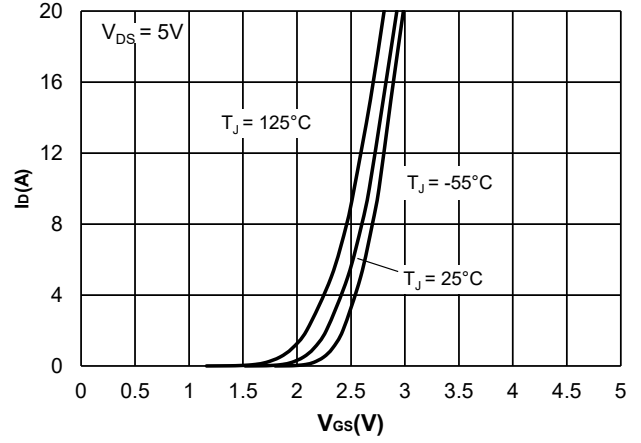


Figure 2: Typical Transfer Characteristics

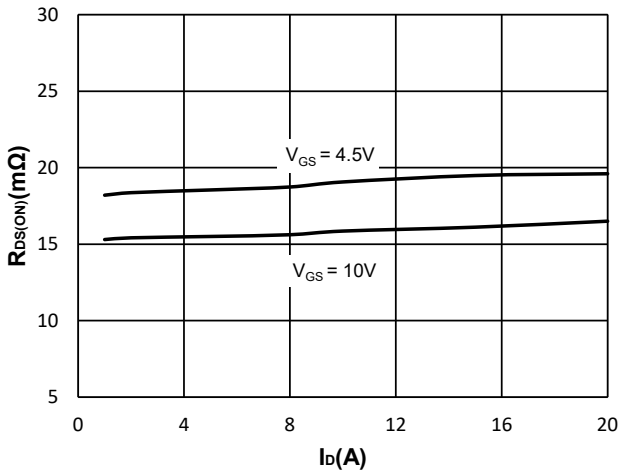


Figure 3: On-resistance vs. Drain Current

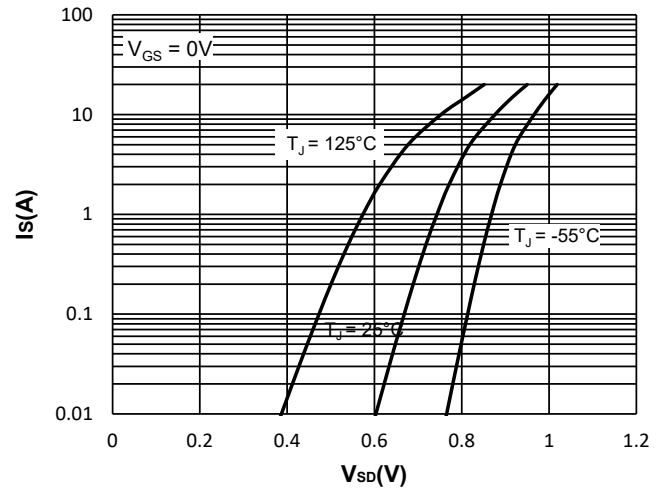


Figure 4: Body Diode Characteristics

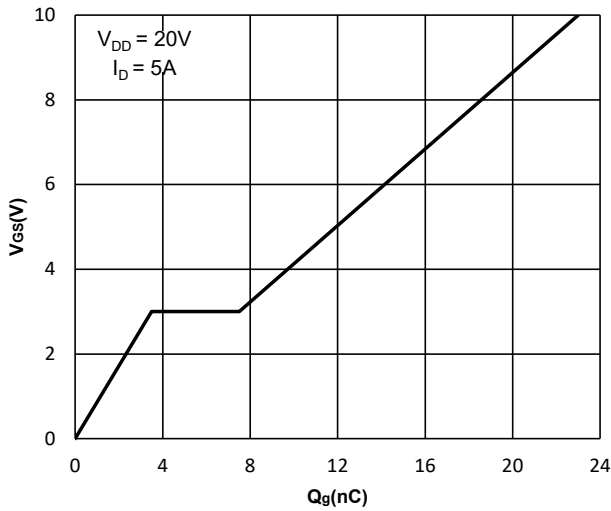


Figure 5: Gate Charge Characteristics

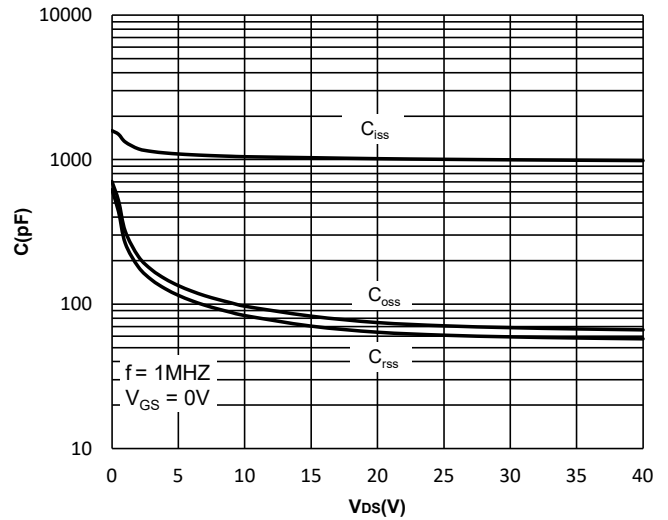


Figure 6: Capacitance Characteristics

■ N-TYPICAL CHARACTERISTICS(Cont.)

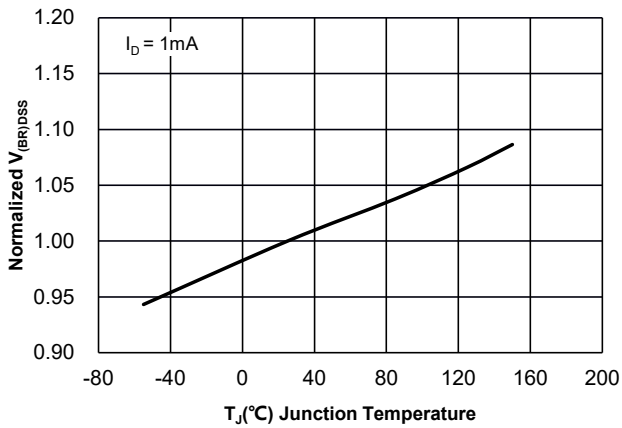


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

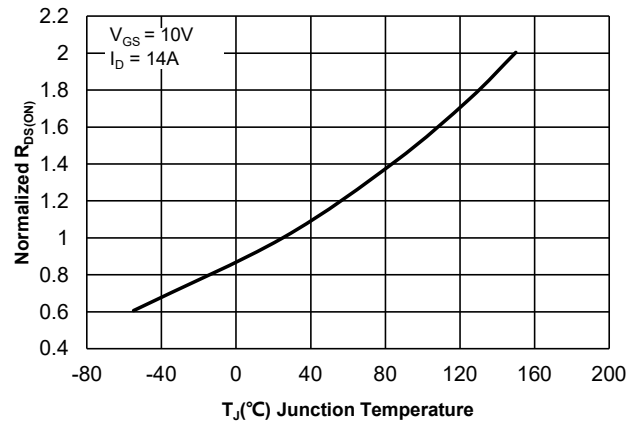


Figure 8: Normalized on Resistance vs. Junction Temperature

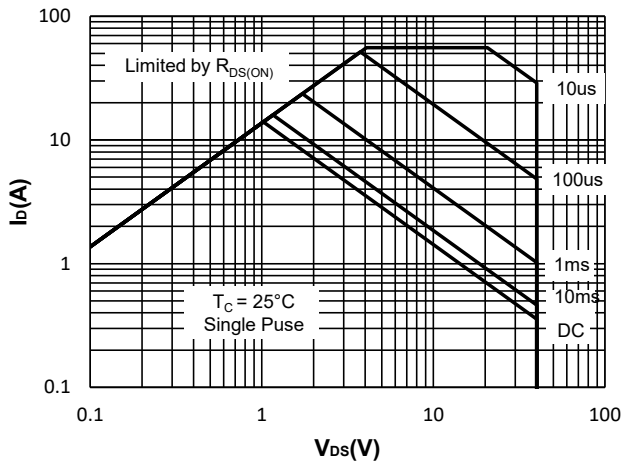


Figure 9: Maximum Safe Operating Area

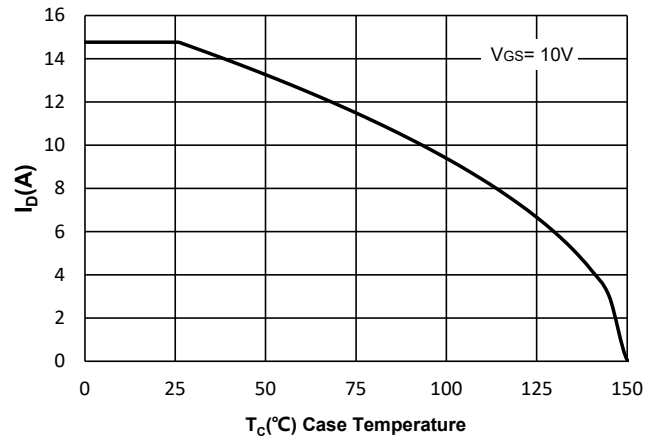


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

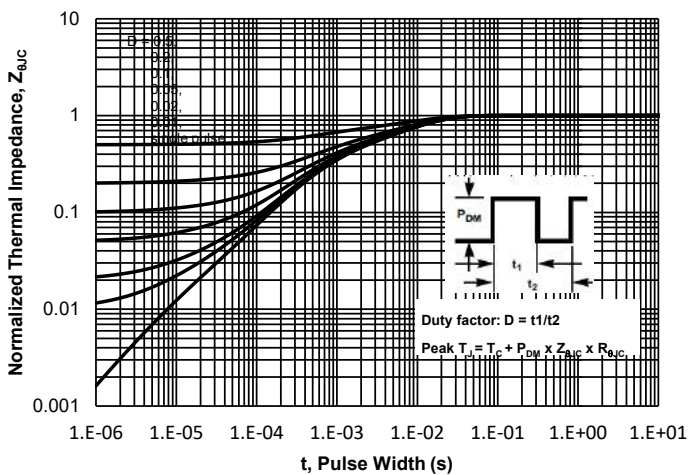


Figure 11: Normalized Maximum Transient Thermal Impedance

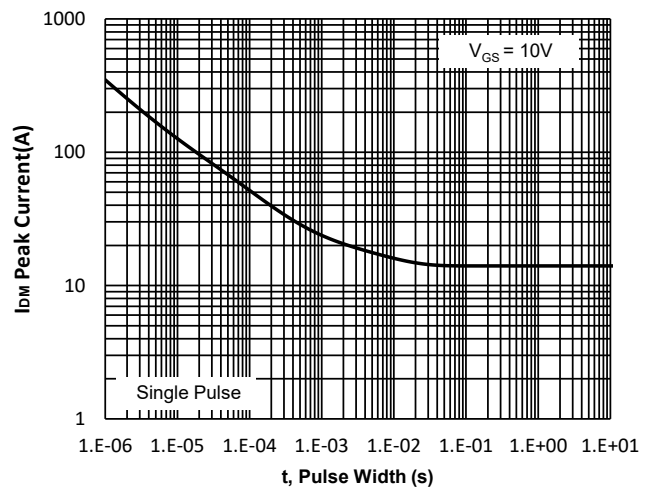


Figure 12: Peak Current Capacity

■ P-TYPICAL CHARACTERISTICS

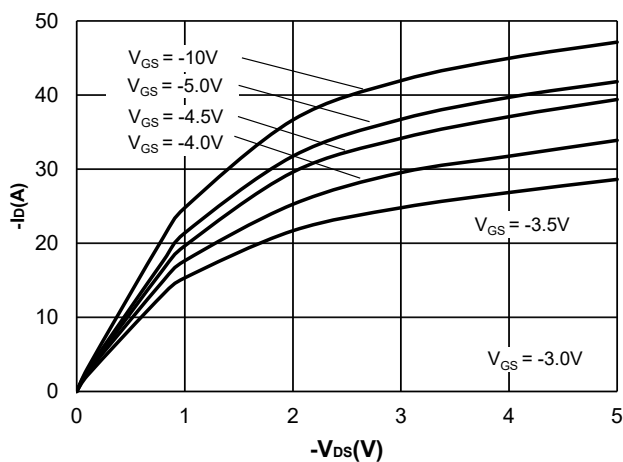


Figure 1: Output Characteristics

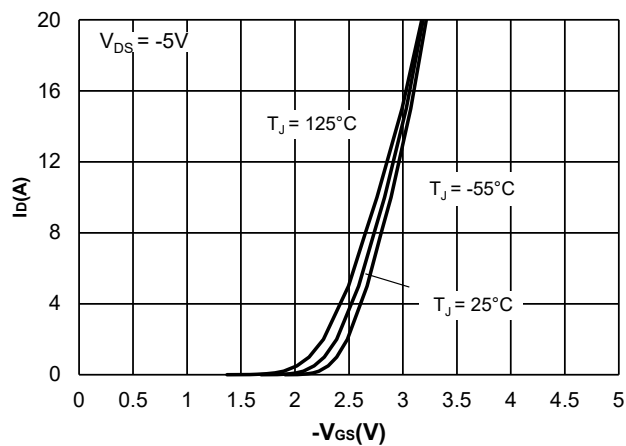


Figure 2: Typical Transfer Characteristics

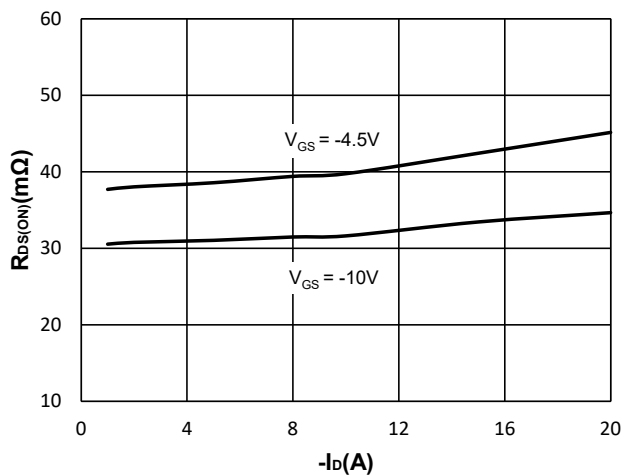


Figure 3: On-resistance vs. Drain Current

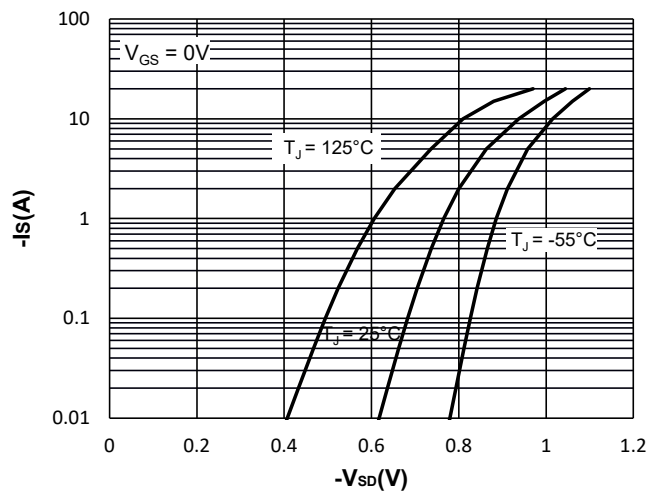


Figure 4: Body Diode Characteristics

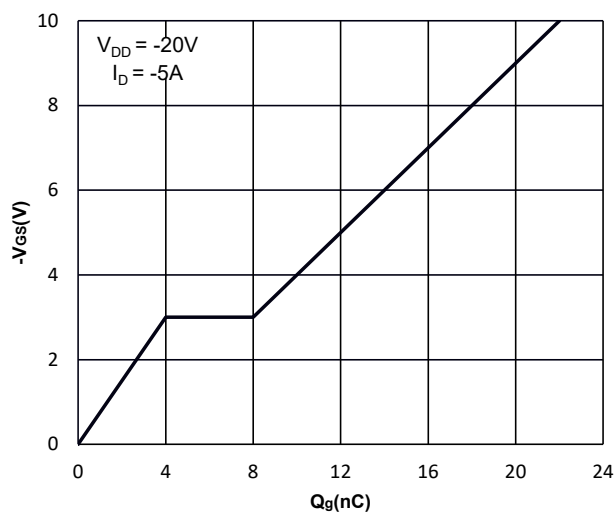


Figure 5: Gate Charge Characteristics

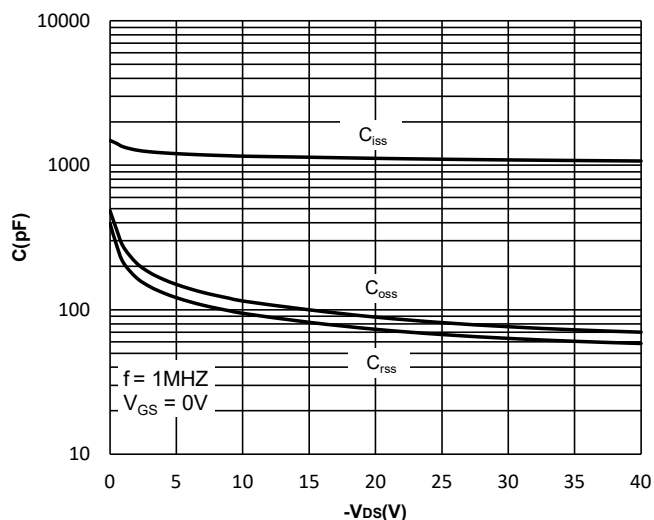


Figure 6: Capacitance Characteristics

■ P-TYPICAL CHARACTERISTICS(Cont.)

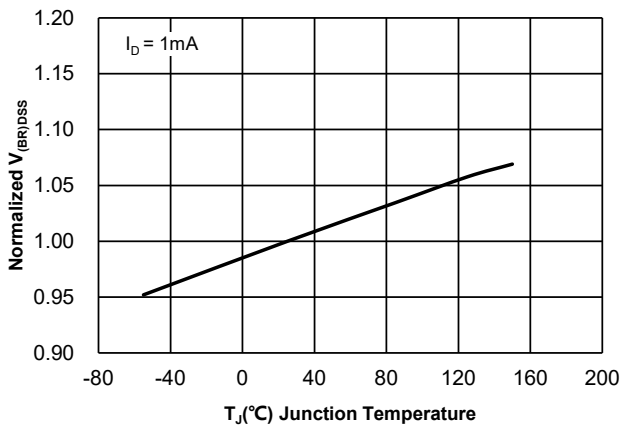


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

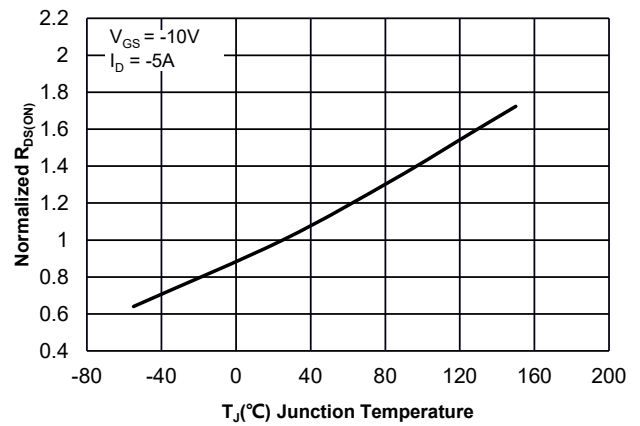


Figure 8: Normalized on Resistance vs. Junction Temperature

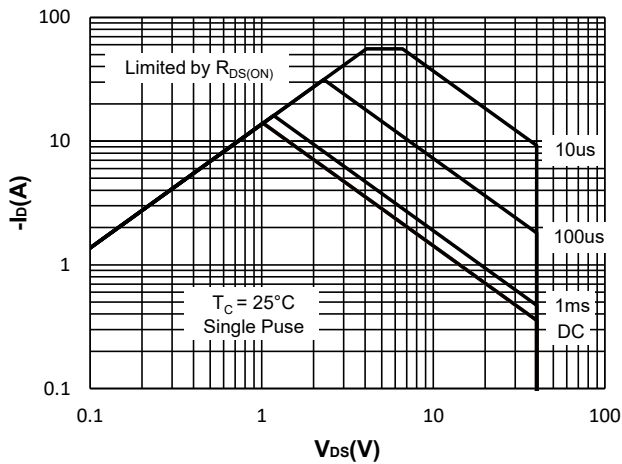


Figure 9: Maximum Safe Operating Area

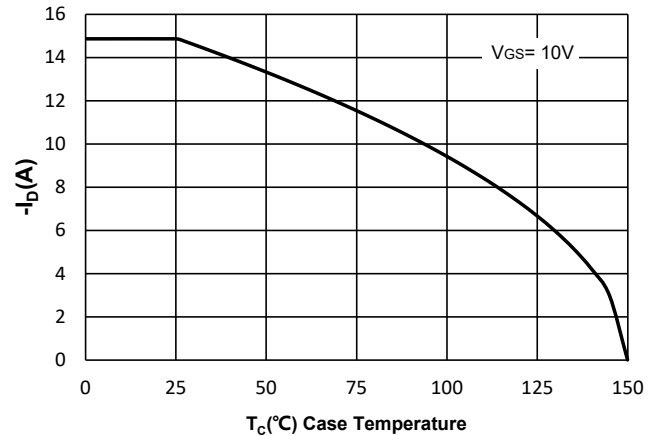


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

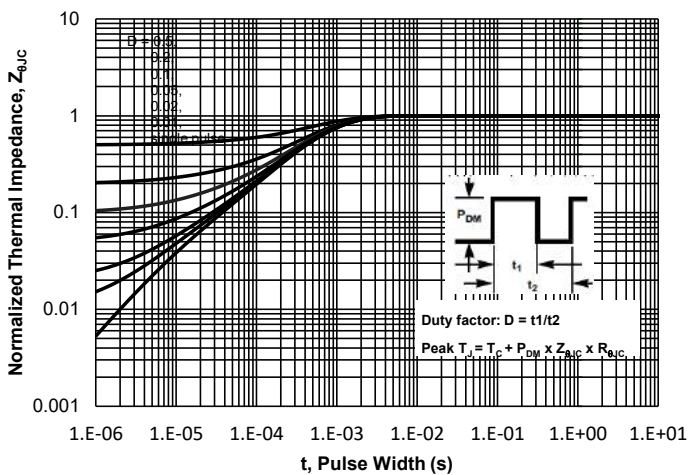


Figure 11: Normalized Maximum Transient Thermal Impedance

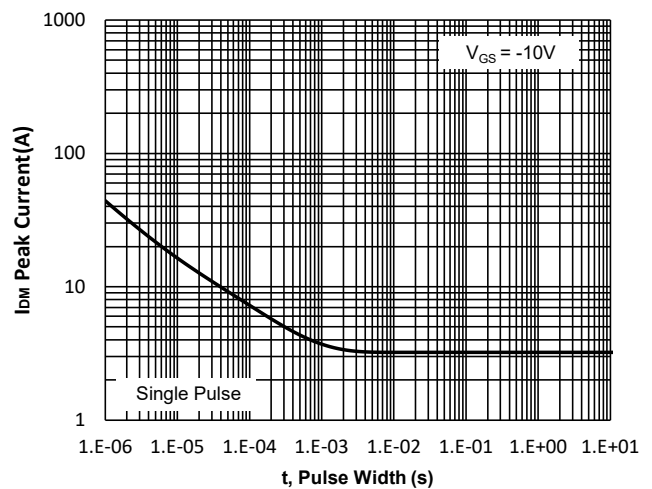


Figure 12: Peak Current Capacity

■ PDFN3X3-8L PACKAGE MECHANICAL DATA

