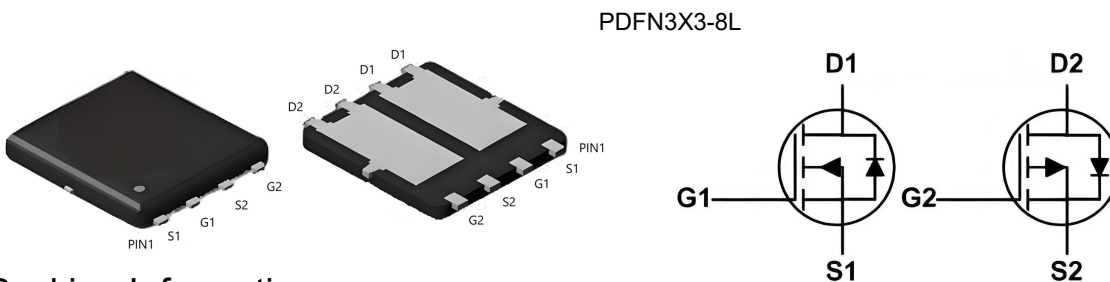


N-Channel and P-Channel 20V(D-S) MOSFET

Product summary			
V_{DS}	20	-20	V
$R_{DS(ON)}$ (at $V_{GS}=4.5V$) Typ.	8	15.5	m Ω
$R_{DS(ON)}$ (at $V_{GS}=2.5V$) Typ.	12	22	m Ω
$I_D(T_C=25^\circ C)$	25	-25	A

Features
<ul style="list-style-type: none"> ● Low Gate Charge ● Advanced high cell density Trench technology
Applications
<ul style="list-style-type: none"> ● Motor driver ● Wireless charging

Pin Configuration



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECAL25C02C	PDFN3X3-8L	13"	5000pcs

Absolute Maximum Ratings (at $T_A=25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	N-Rating	P-Rating	Units	
V_{DS}	Drain-Source Voltage	20	-20	V	
V_{GS}	Gate-Source Voltage	± 12	± 12	V	
I_D	Continuous Drain Current	$T_C=25^\circ C$	25	-25	A
		$T_C=100^\circ C$	15.8	-15.8	A
I_{DM}	Pulse Drain Current Tested ^A	78	69	A	
E_{AS}	Single Pulse Avalanche Energy ^B	36	42	mJ	
P_D	Power Dissipation	$T_C=25^\circ C$	11	20	W
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	-55 to +150	$^\circ C$	

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JA}$	Thermal Resistance-Junction to ambient ^C	30	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance-Junction to case	4	$^\circ C/W$

N-Channel Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V$	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.7	1.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^D	$V_{GS}=4.5V, I_D=10A$	--	8	12	m Ω
		$V_{GS}=2.5V, I_D=8A$	--	12	17	m Ω
V_{SD}	Diode Forward Voltage	$I_S=10A, V_{GS}=0V$	--	--	1.2	V
Dynamic Parameters ^E						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=10V$ $f=1\text{MHz}$	--	1010	--	pF
C_{oss}	Output Capacitance		--	176	--	pF
C_{rss}	Reverse Transfer Capacitance		--	169	--	pF
Q_g	Total Gate Charge	$V_{DS}=10V, I_D=10A$ $V_{GS}=10V$	--	28	--	nC
Q_{gs}	Gate-Source Charge		--	1.9	--	nC
Q_{gd}	Gate-Drain Charge		--	6.4	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=10V$ $R_L=2.5\Omega, I_D=20A,$ $V_{GS}=10V$	--	13	--	nS
t_r	Turn-on Rise Time		--	18	--	nS
$t_{D(off)}$	Turn-off Delay Time		--	36	--	nS
t_f	Turn-off Fall Time		--	16	--	nS

A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

B. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=10V, V_G=4.5V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=12A$.

C. The data tested by surface mounted on a 1 inch x 1 inch FR-4 board with 20Z copper.

D. Pulse Test: Pulse Width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

E. Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20V, V_{GS}=0V$	--	--	-1	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
$R_{DS(on)}$	Drain-Source On-State Resistance ^D	$V_{GS}=-4.5V, I_D=-10A$	--	15.5	21	m Ω
		$V_{GS}=-2.5V, I_D=-8A$	--	22	29	m Ω
V_{SD}	Diode Forward Voltage	$I_S=-10A, V_{GS}=0V$	--	--	-1.2	V
Dynamic Parameters ^E						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-10V$ $f=1\text{MHz}$	--	1610	--	pF
C_{oss}	Output Capacitance		--	230	--	pF
C_{rss}	Reverse Transfer Capacitance		--	201	--	pF
Q_g	Total Gate Charge	$V_{DS}=-10V, I_D=-3A$ $V_{GS}=-4.5V$	--	14	--	nC
Q_{gs}	Gate-Source Charge		--	1.9	--	nC
Q_{gd}	Gate-Drain Charge		--	3.8	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=-10V$ $R_G=4.7\Omega, I_D=-7A,$ $V_{GS}=-4.5V$	--	9	--	nS
t_r	Turn-on Rise Time		--	28	--	nS
$t_{D(off)}$	Turn-off Delay Time		--	27	--	nS
t_f	Turn-off Fall Time		--	6	--	nS

A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

B. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=10V, V_G=4.5V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=13A$.

C. The data tested by surface mounted on a 1 inch x 1 inch FR-4 board with 2OZ copper.

D. Pulse Test: Pulse Width $\leq 300\mu s$, Duty cycle $\leq 0.5\%$.

E. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

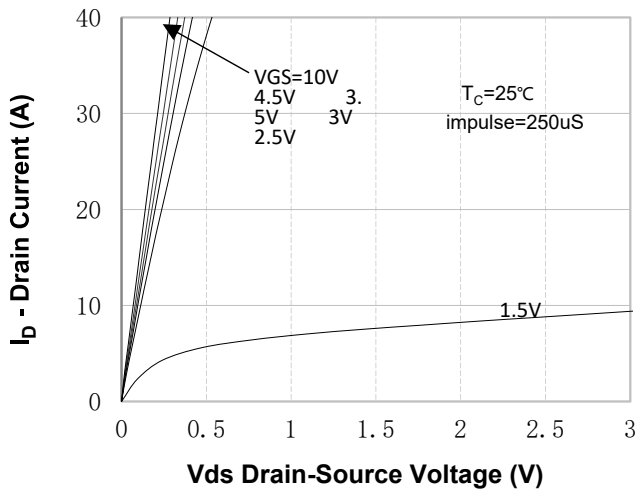


Figure 1. On-Region Characteristics

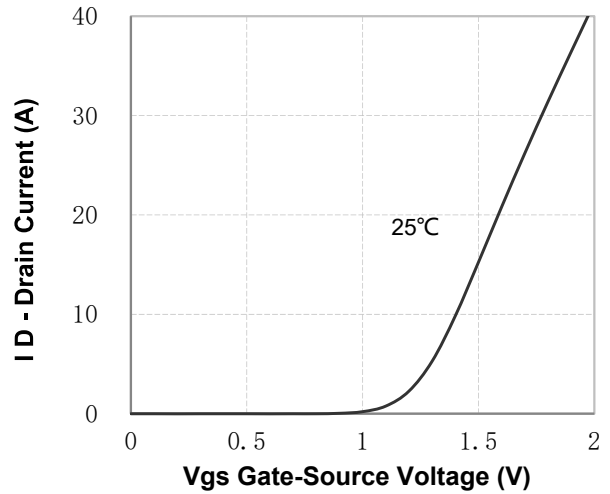


Figure 2. Transfer Characteristics

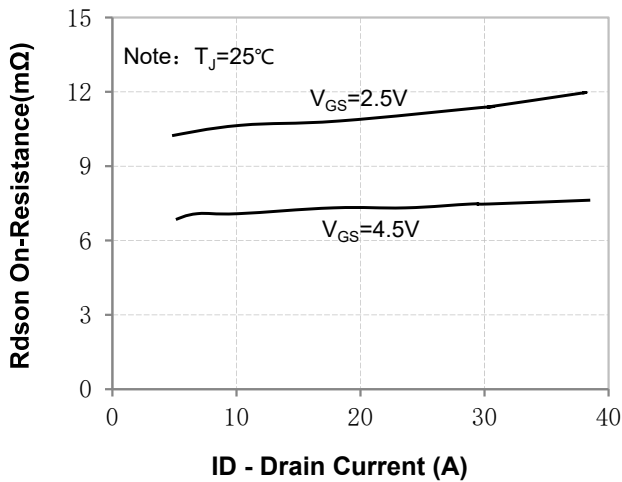


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

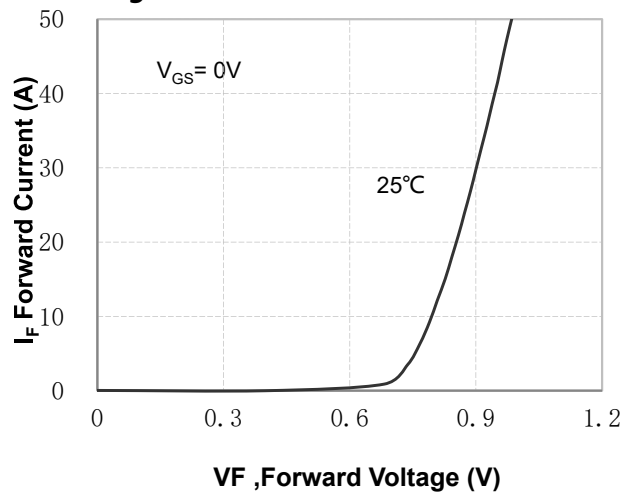


Figure 4. Body Diode Forward Voltage Variation with Source Current

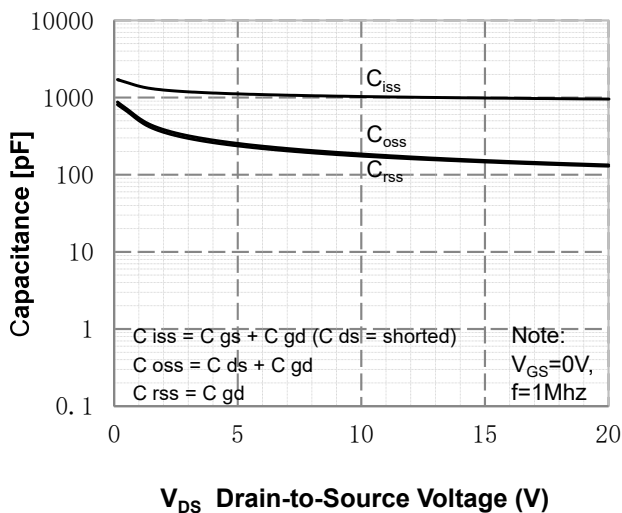


Figure 5. Capacitance Characteristics

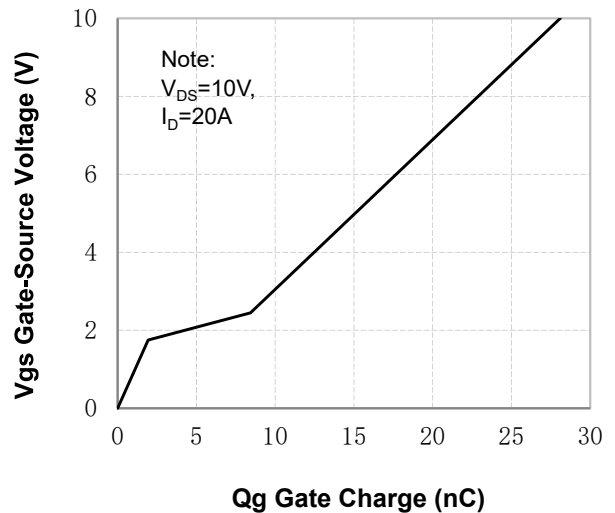


Figure 6. Gate Charge Characteristics

N-Channel Typical Characteristics

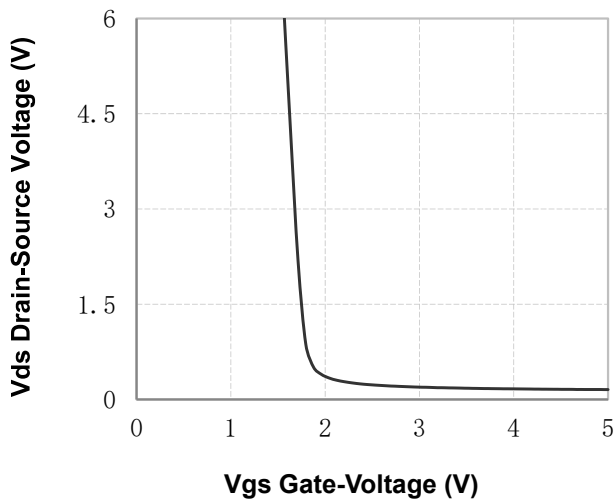


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

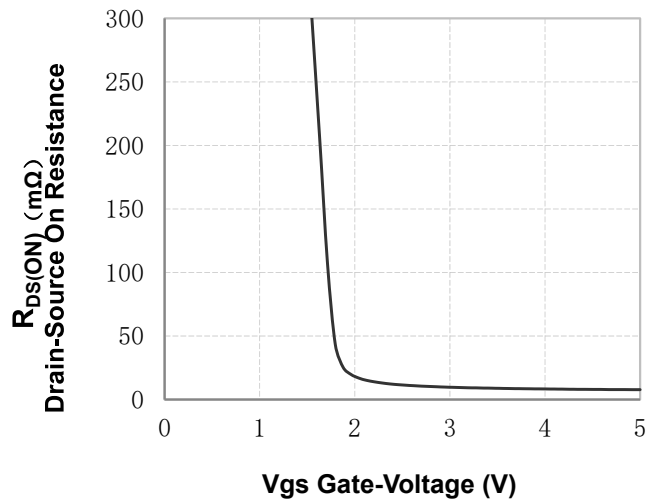


Figure 8. On-Resistance vs Gate Voltage

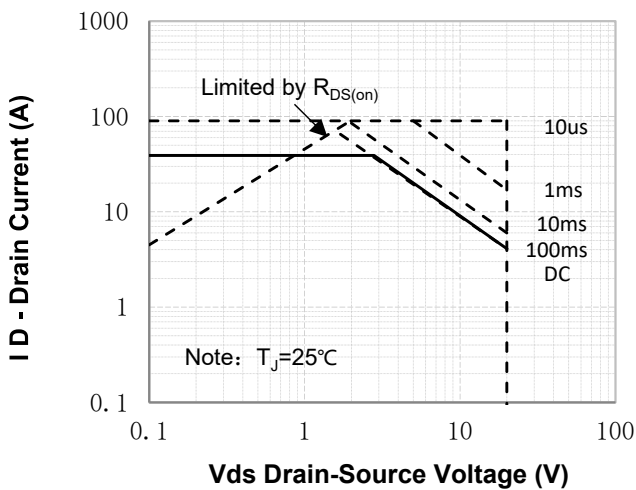


Figure 9. Maximum Safe Operating Area

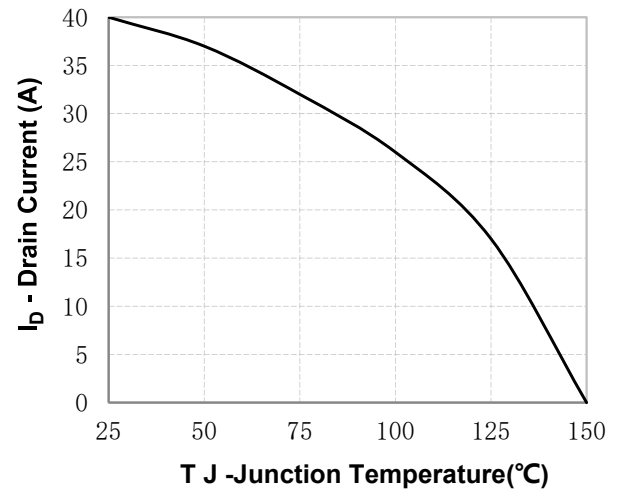


Figure 10. Maximum Continuous Drain Current vs Temperature

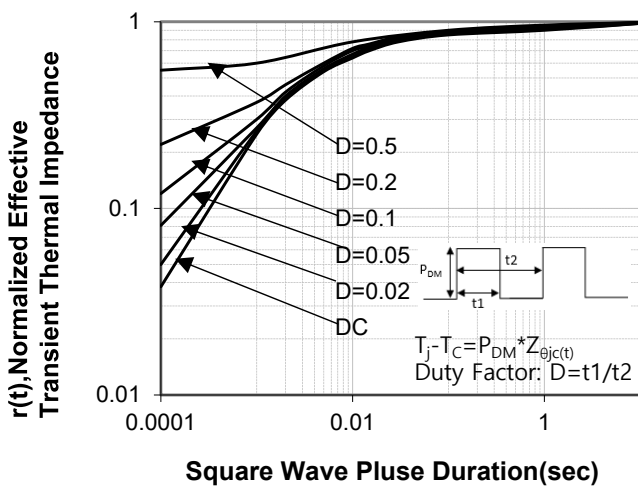


Figure 11. Transient Thermal Response Curve

P-Channel Typical Characteristics

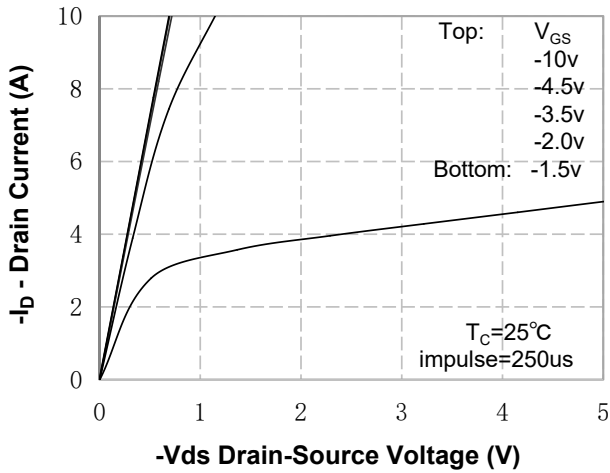


Figure 1. On-Region Characteristics

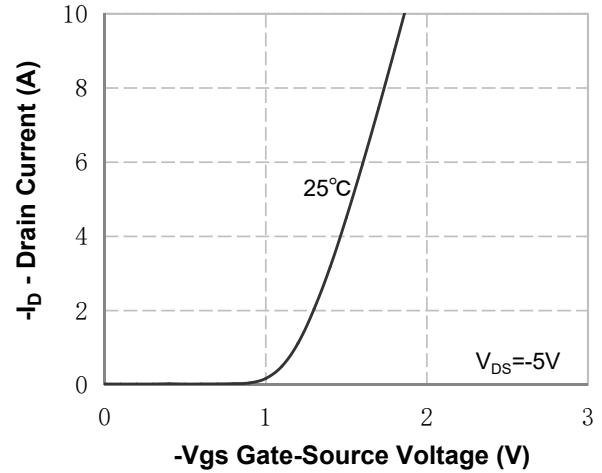


Figure 2. Transfer Characteristics

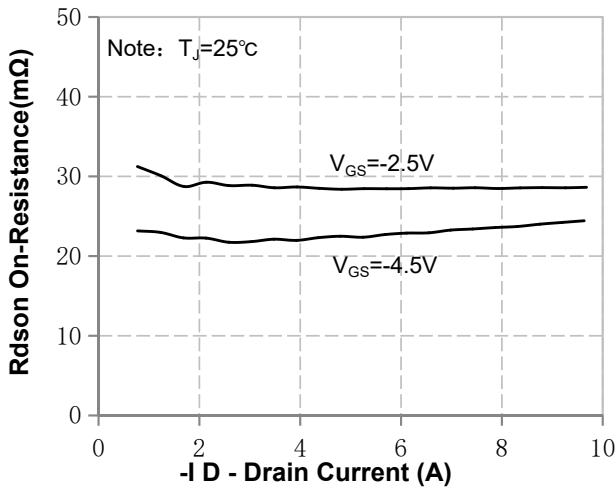


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

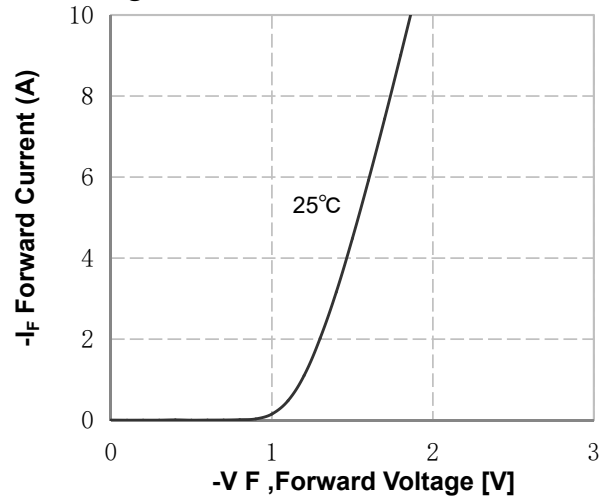


Figure 4. Body Diode Forward Voltage Variation with Source Current

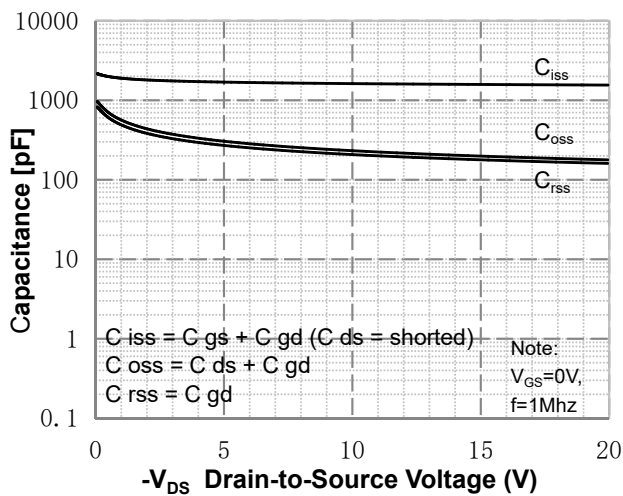


Figure 5. Capacitance Characteristics

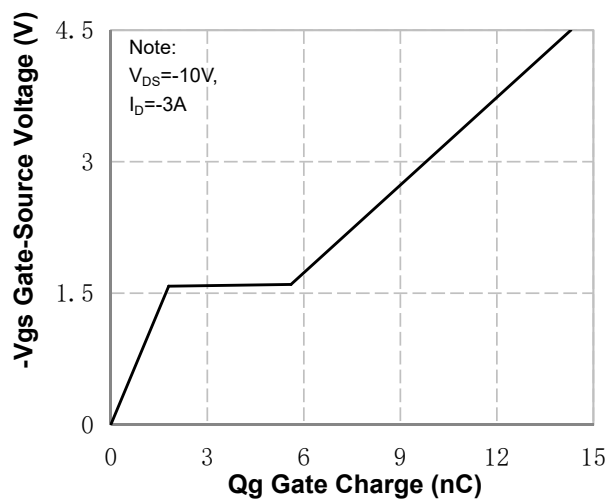


Figure 6. Gate Charge Characteristics

P-Channel Typical Characteristics

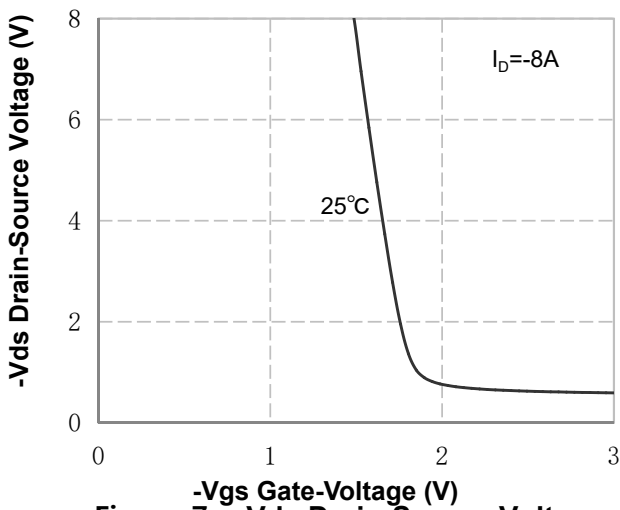


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

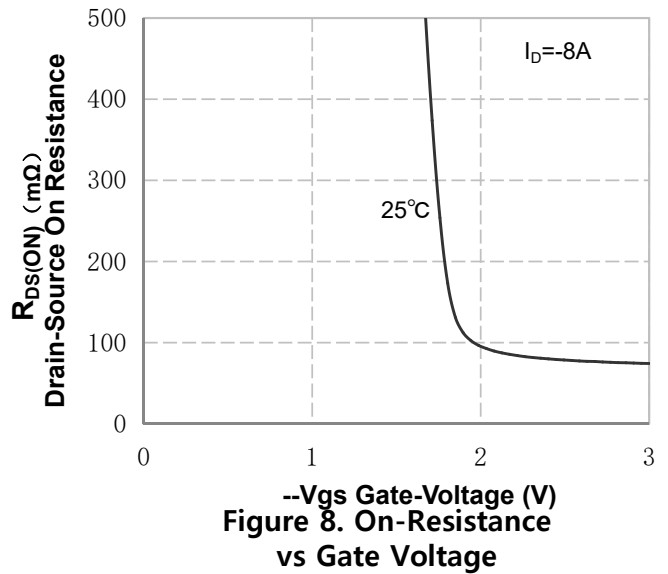


Figure 8. On-Resistance vs Gate Voltage

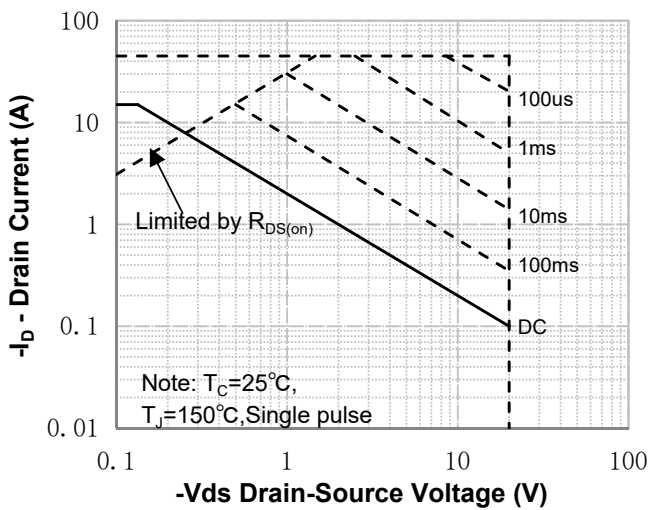


Figure 9. Maximum Safe Operating Area

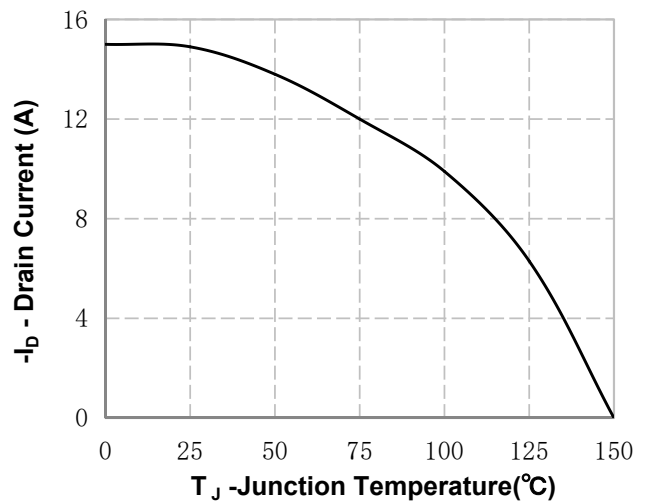


Figure 10. Maximum Continuous Drain Current vs Temperature

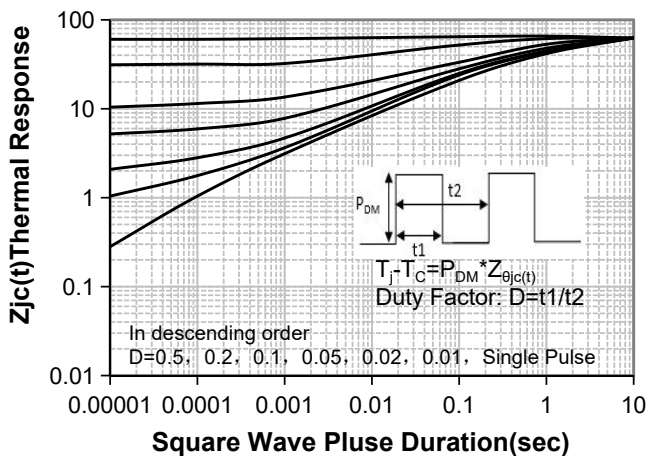
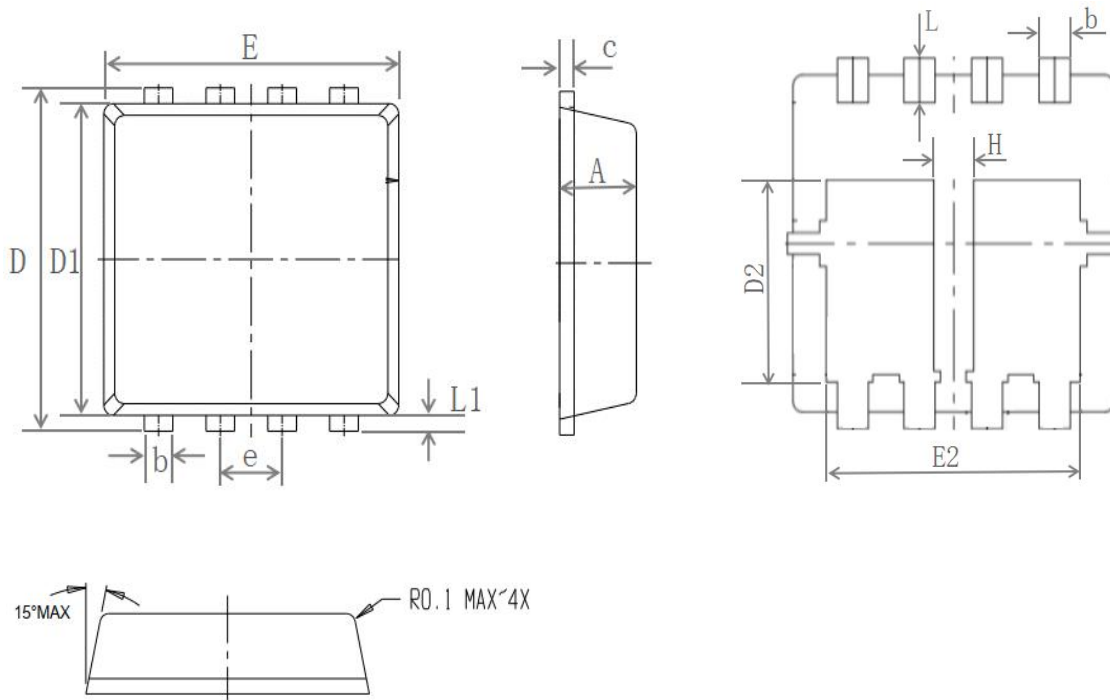


Figure 11. Transient Thermal Response Curve

PDFN3X3-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.750	0.850	0.295	0.335
b	0.250	0.350	0.098	0.138
c	0.100	0.250	0.039	0.098
D	3.200	3.400	1.260	1.339
D1	2.900	3.100	1.142	1.220
D2	1.635	1.880	0.644	0.740
D3	0.100	0.300	0.039	0.118
E	3.000	3.200	1.181	1.260
E2	2.400	2.600	0.945	1.024
e	0.658REF		0.259REF	
H	0.280	0.480	0.110	0.189
L	0.300	0.500	0.118	0.197
L1	0.100	0.200	0.039	0.079