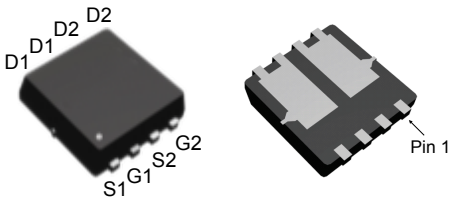
Features

- N Channel : 40V/24A,
  $R_{DS(ON)}$=15.5mΩ(typ.)@V_{GS}=10V
  $R_{DS(ON)}$=18.5mΩ(typ.)@V_{GS}=4.5V
- P Channel : -40V/-20A,
  $R_{DS(ON)}$=35mΩ(typ.)@V_{GS}=-10V
  $R_{DS(ON)}$=51mΩ(typ.)@V_{GS}=-4.5V
- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)
- Moisture Sensitivity Level MSL1 (per JEDEC J-STD-020D)

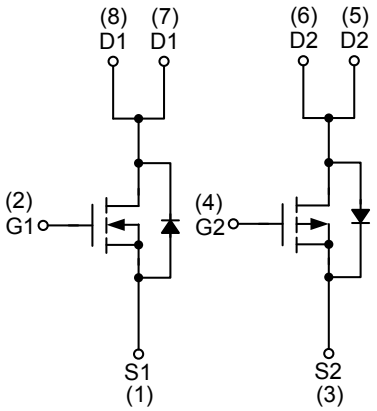
Applications

- For Fan Pre-driver H-Bridge.
- Motor Control.
- Synchronous Rectification.

Pin Description



DFN3.3x3.3G-8_EP2



N-Channel MOSFET P-Channel MOSFET

Absolute Maximum Ratings (T_A=25°C Unless Otherwise Noted)

Symbol	Parameter		N Channel	P Channel	Unit
Common Ratings					
V_{DSS}	Drain-Source Voltage		40	-40	V
V_{GSS}	Gate-Source Voltage		±20	±20	
T_J	Maximum Junction Temperature		150		°C
T_{STG}	Storage Temperature Range		-55 to 150		
I_S	Diode Continuous Forward Current	T_C=25°C	24	-20	A
I_D	Continuous Drain Current	T_C=25°C	24	-20	A
		T_C=100°C	9.6	-8	A
I_{DM} [a]	Pulse Drain Current Tested	T_C=25°C	72	-60	A
P_D	Maximum Power Dissipation	T_C=25°C	13.9	13.9	W
		T_C=100°C	5.6	5.6	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		9	9	°C/W
I_D	Continuous Drain Current	T_A=25°C	6.5	-4.5	A
		T_A=70°C	5.2	-3.6	
P_D	Maximum Power Dissipation	T_A=25°C	1.32		W
		T_A=70°C	0.84		
$R_{\theta JA}$ [c]	Thermal Resistance-Junction to Ambient	Steady State	95		°C/W
I_{AS} [b]	Avalanche Current, Single pulse	L=0.5mH	10	-11	A
E_{AS} [b]	Avalanche Energy, Single pulse	L=0.5mH	25	30	mJ

Note * : Calculated continuous current based on maximum allowable junction temperature. Bonding wire limitation current is 8A.
Note a : Pulse width limited by maximum junction temperature.
Note b : UIS tested and pulse width limited by maximum junction temperature (initial temperature T_J=25°C).
Note c : Surface Mounted on 1in^2 pad area.

N Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	N Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=32V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.5	2	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=8A	-	15.5	20	mΩ
		V_{GS}=4.5V, I_{DS}=7A	-	18.5	24	
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=1A, V_{GS}=0V	-	0.75	1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=8A, dI_{SD}/dt=100A/μs	-	14.5	-	ns
Q_{rr}	Reverse Recovery Charge		-	9	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	2.3	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=20V, Frequency=1.0MHz	-	790	1027	pF
C_{oss}	Output Capacitance		-	100	-	
C_{rss}	Reverse Transfer Capacitance		-	65	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=20V, R_L=20Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	10	18	ns
t_r	Turn-on Rise Time		-	7.5	14	
$t_{d(OFF)}$	Turn-off Delay Time		-	23	42	
t_f	Turn-off Fall Time		-	5.5	10	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=10V, I_{DS}=8A	-	14	19.6	nC
Q_g	Total Gate Charge	V_{DS}=20V, V_{GS}=4.5V, I_{DS}=8A	-	7	-	
Q_{gs}	Gate-Source Charge		-	2.5	-	
Q_{gd}	Gate-Drain Charge		-	2.9	-	

Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

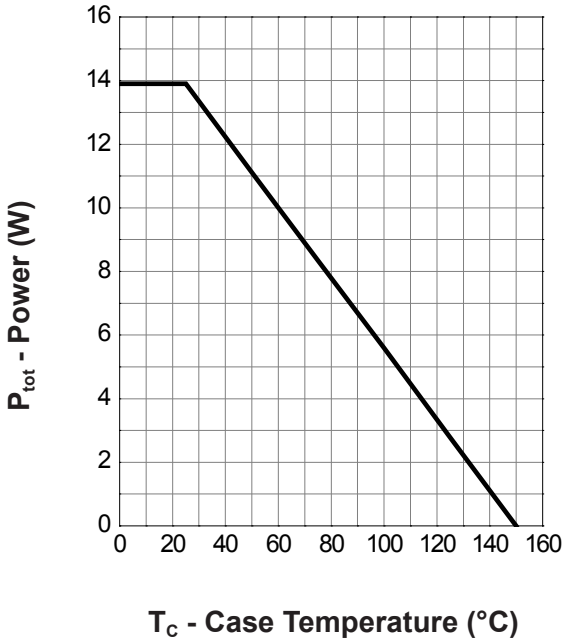
P Channel Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=-250μA	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-32V, V_{GS}=0V	-	-	-1	μA
		T_J=85°C	-	-	-30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	-1.5	-2	-2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=-10V, I_{DS}=-8A	-	35	45	mΩ
		V_{GS}=-4.5V, I_{DS}=-6A	-	51	66	
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=-1A, V_{GS}=0V	-	-0.75	-1.1	V
t_{rr}	Reverse Recovery Time	I_{SD}=-8A, dI_{SD}/dt=100A/μs	-	16	-	ns
Q_{rr}	Reverse Recovery Charge		-	11	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	8	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-20V, Frequency=1.0MHz	-	668	868	pF
C_{oss}	Output Capacitance		-	105	-	
C_{rss}	Reverse Transfer Capacitance		-	80	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-20V, R_L=-20Ω, I_{DS}=-1A, V_{GEN}=-10V, R_G=6Ω	-	9	16	ns
t_r	Turn-on Rise Time		-	7	13	
$t_{d(OFF)}$	Turn-off Delay Time		-	31	56	
t_f	Turn-off Fall Time		-	17	31	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=-20V, V_{GS}=-4.5V, I_{DS}=-8A	-	7.2	-	nC
Q_g	Total Gate Charge	V_{DS}=-20V, V_{GS}=-10V, I_{DS}=-8A	-	14	19.6	
Q_{gs}	Gate-Source Charge		-	2.4	-	
Q_{gd}	Gate-Drain Charge		-	3.8	-	

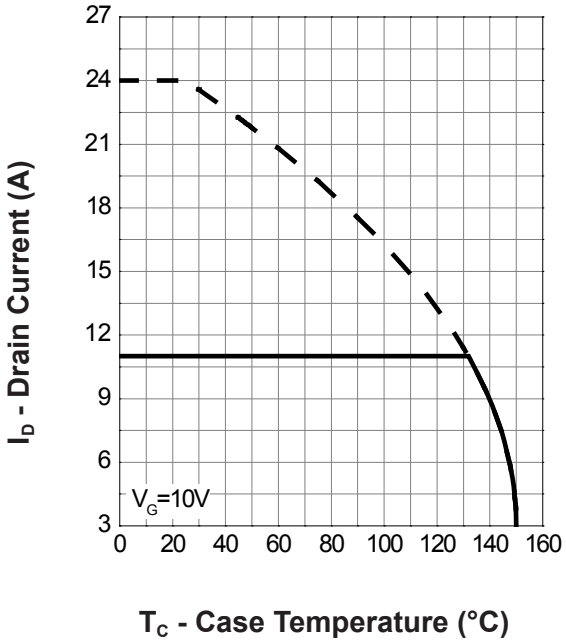
Note d：Pulse test ; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

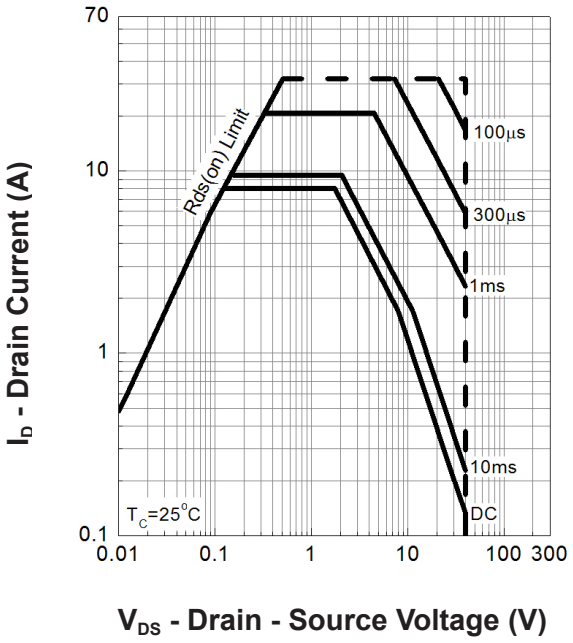
Power Dissipation



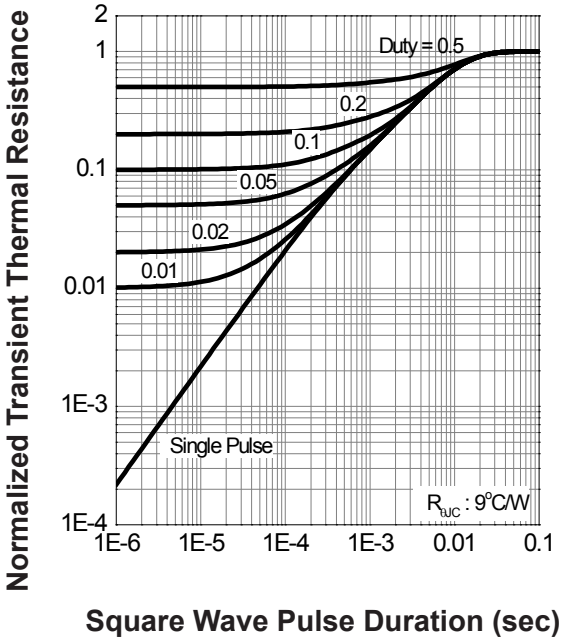
Drain Current



Safe Operation Area

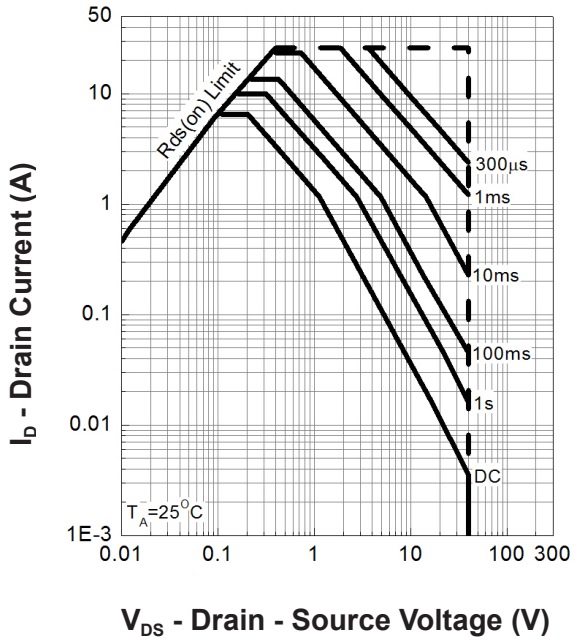


Thermal Transient Impedance

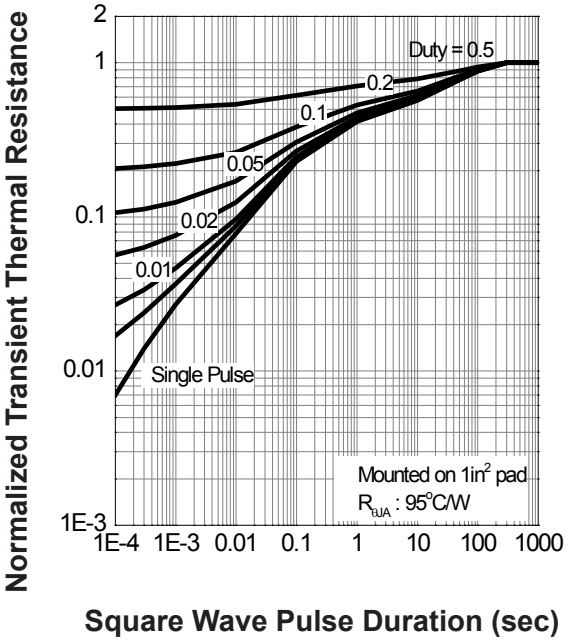


N Channel Typical Operating Characteristics(Cont.)

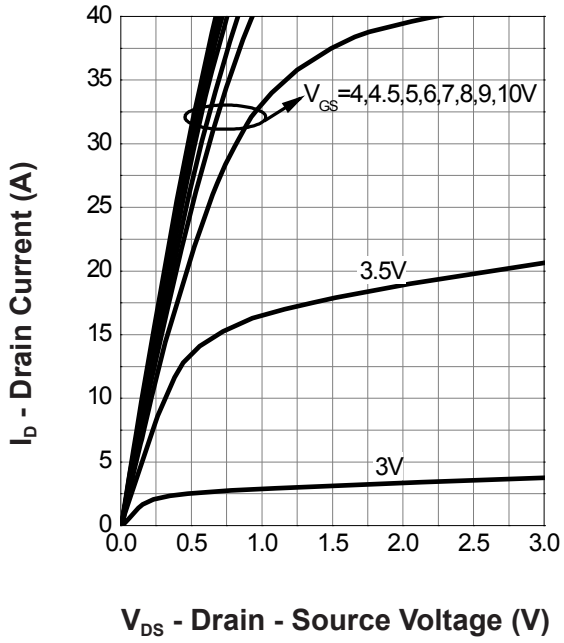
Safe Operation Area



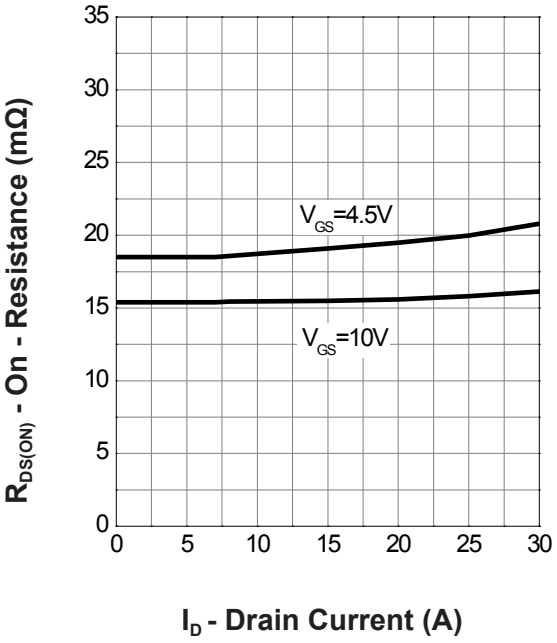
Thermal Transient Impedance



Output Characteristics

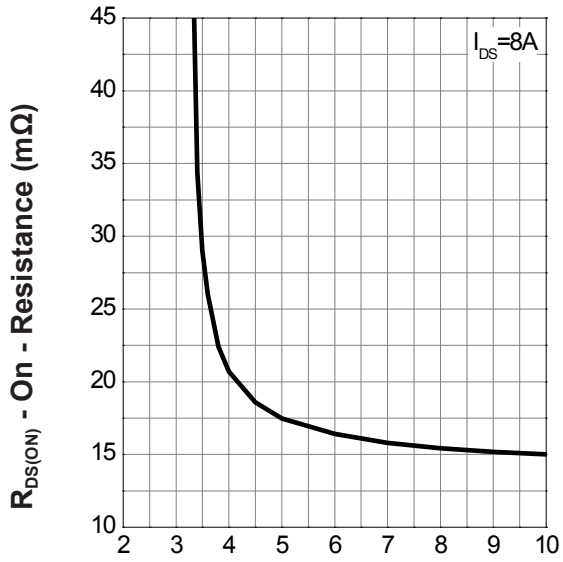


Drain-Source On Resistance

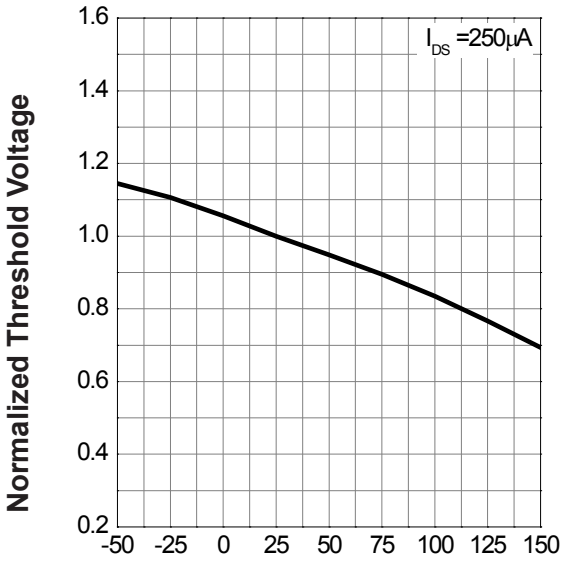


N Channel Typical Operating Characteristics(Cont.)

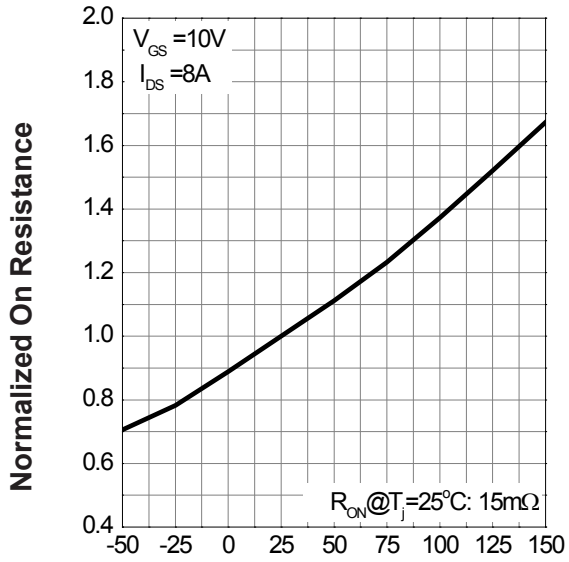
Gate-Source On Resistance



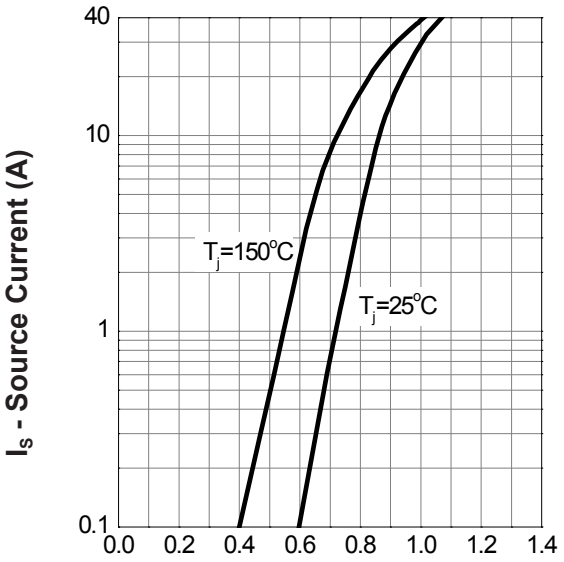
Gate Threshold Voltage



Drain-Source On Resistance

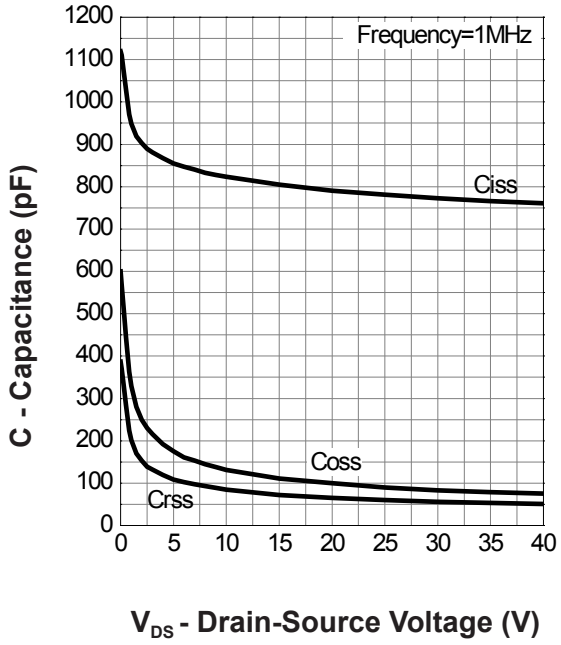


Source-Drain Diode Forward

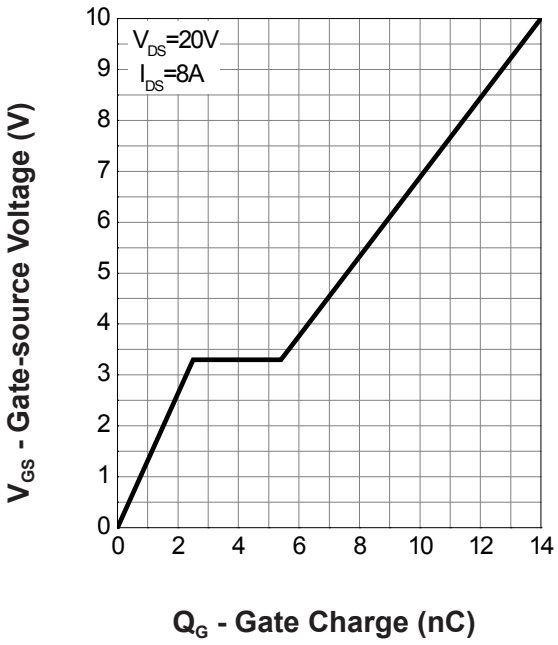


N Channel Typical Operating Characteristics(Cont.)

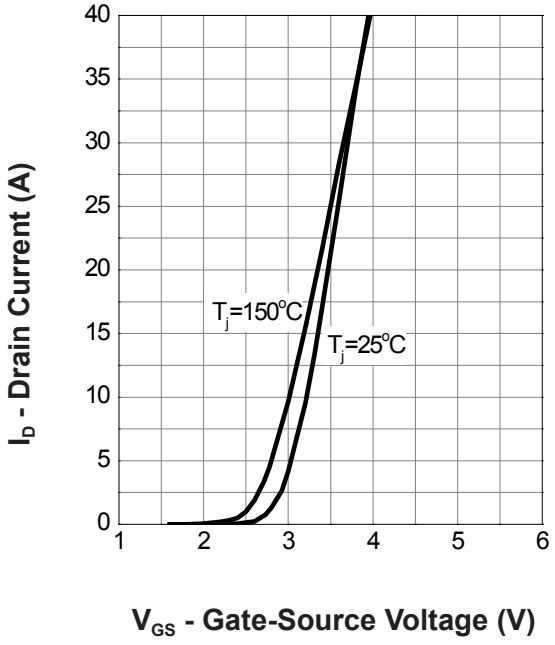
Capacitance



Gate Charge

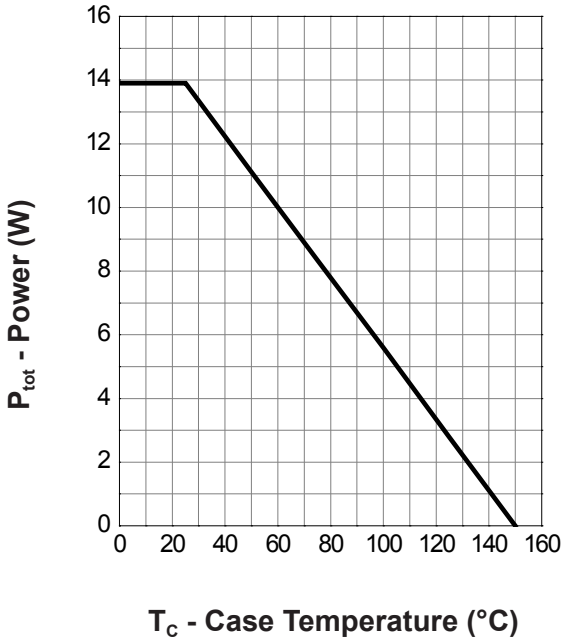


Transfer Characteristics

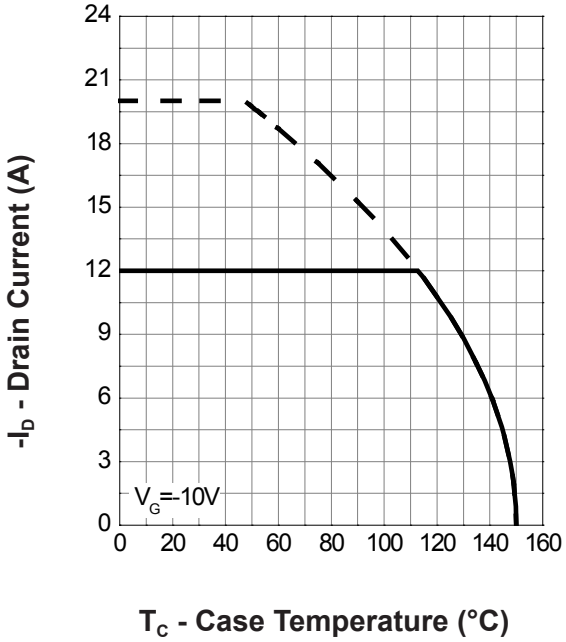


P Channel Typical Operating Characteristics

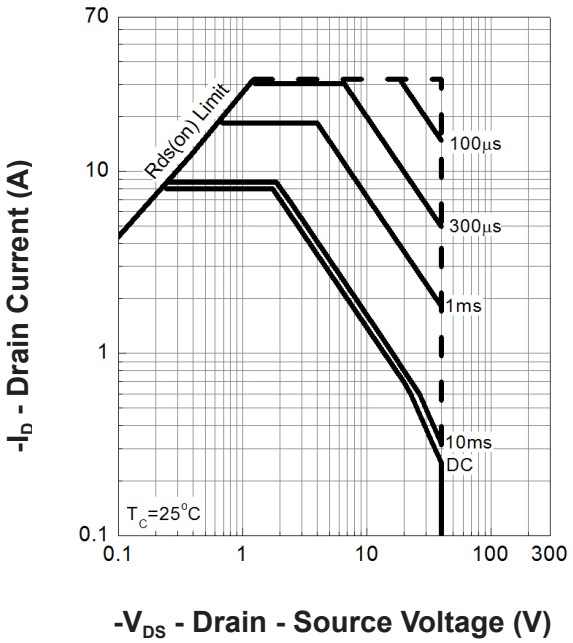
Power Dissipation



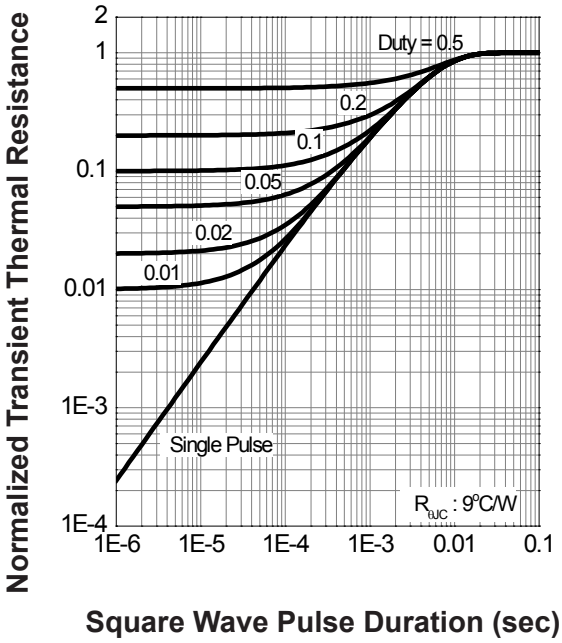
Drain Current



Safe Operation Area

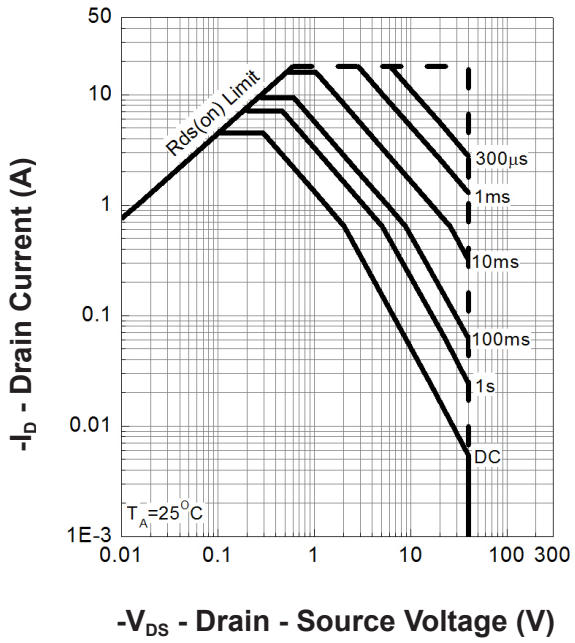


Thermal Transient Impedance

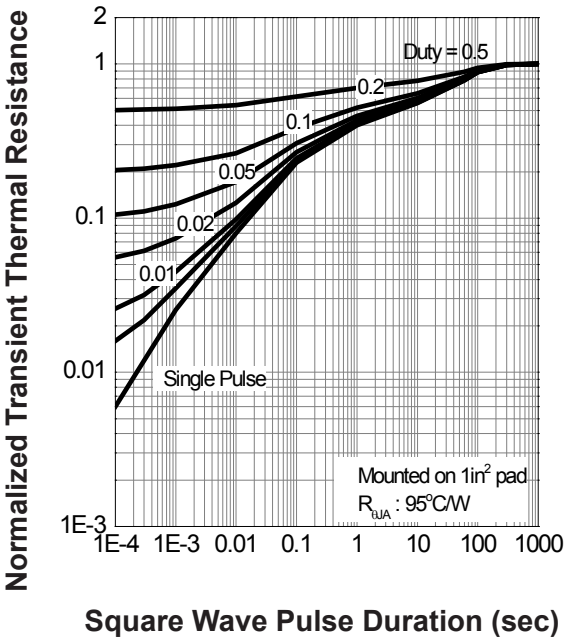


P Channel Typical Operating Characteristics(Cont.)

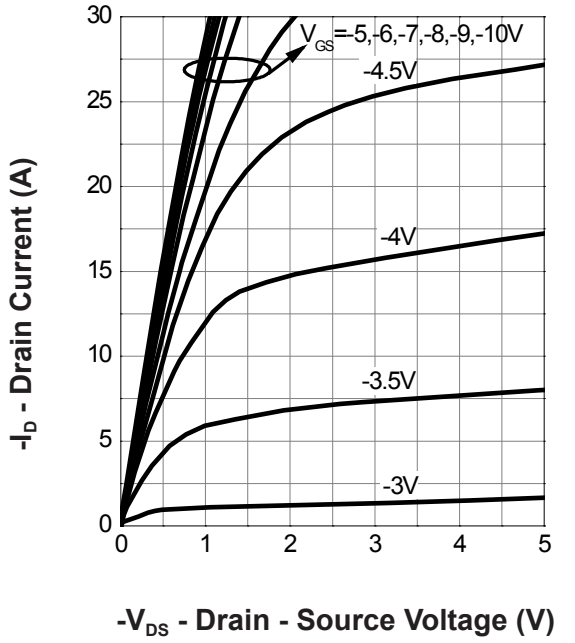
Safe Operation Area



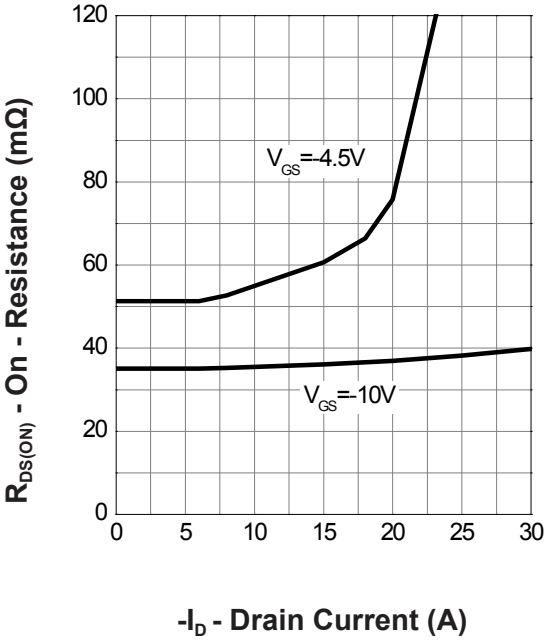
Thermal Transient Impedance



Output Characteristics

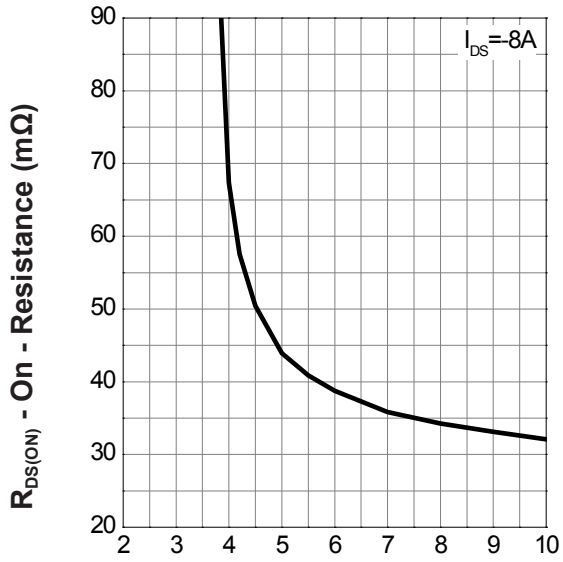


Drain-Source On Resistance

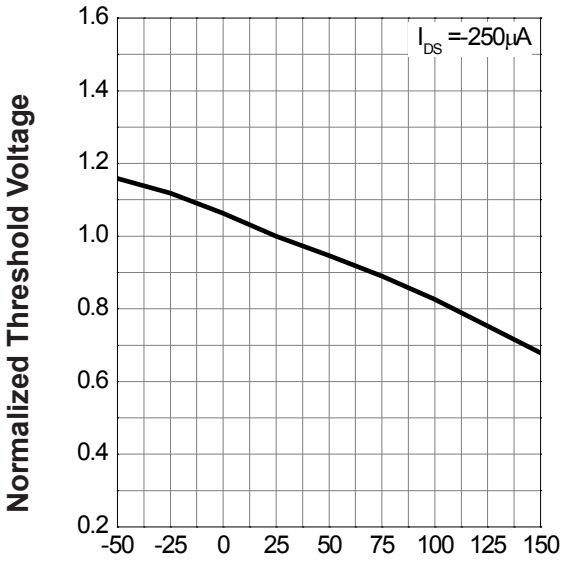


P Channel Typical Operating Characteristics(Cont.)

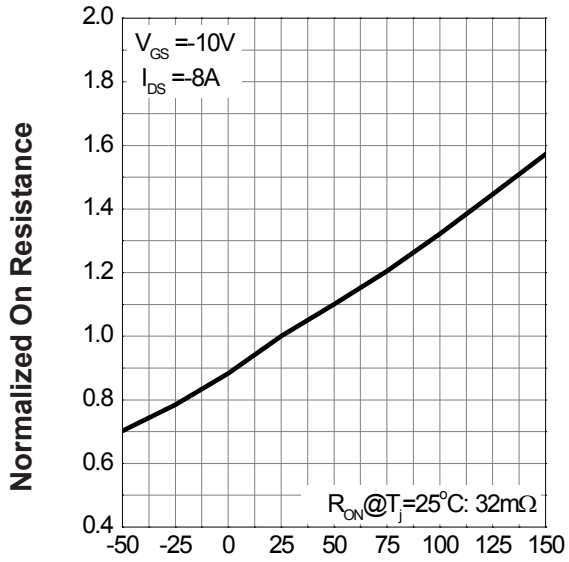
Gate-Source On Resistance



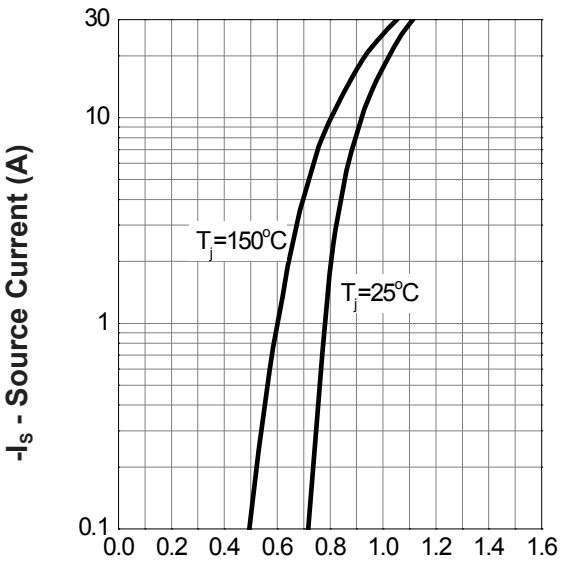
Gate Threshold Voltage



Drain-Source On Resistance

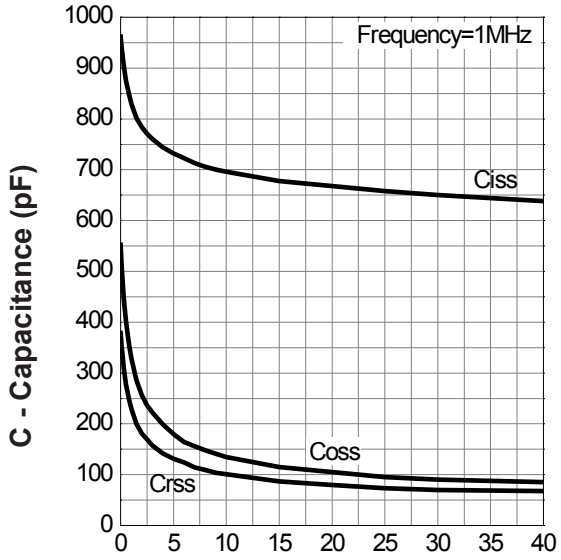


Source-Drain Diode Forward

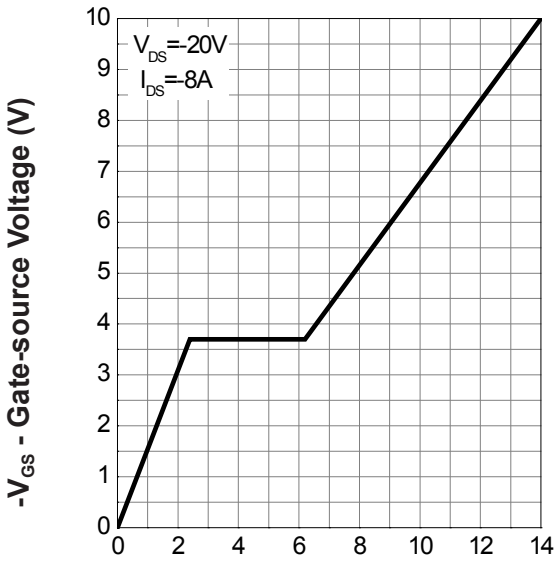


P Channel Typical Operating Characteristics(Cont.)

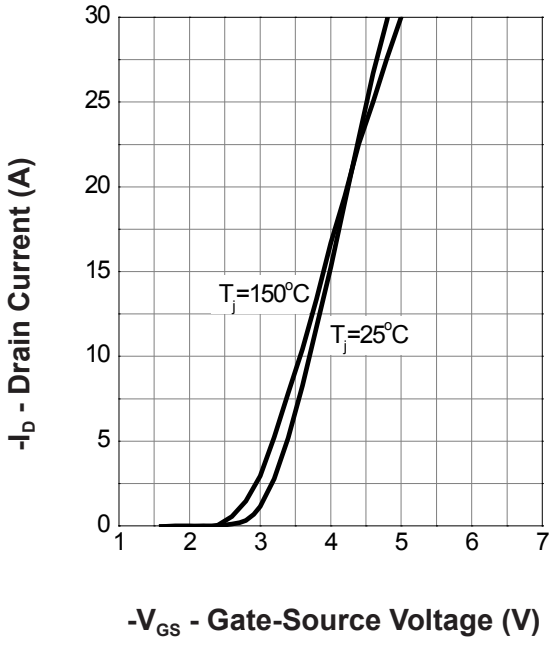
Capacitance



Gate Charge

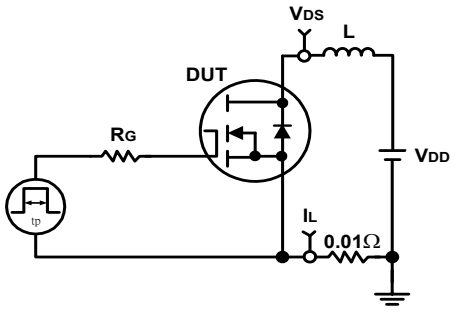


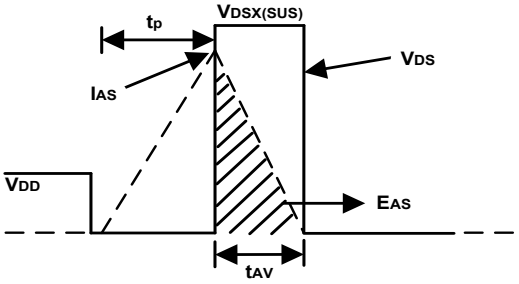
Transfer Characteristics



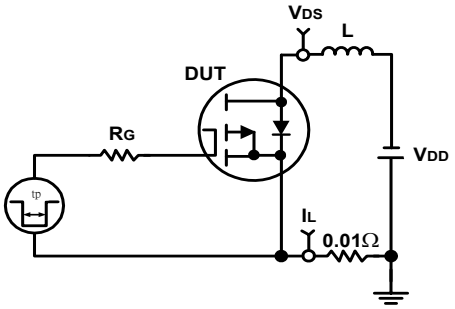
Avalanche Test Circuit and Waveforms

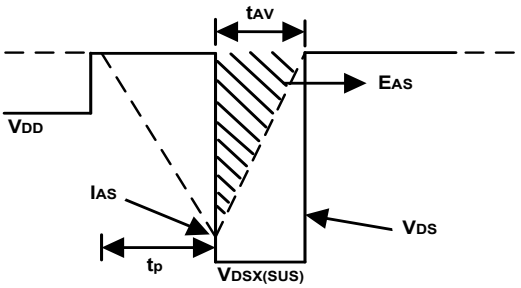
N Channel





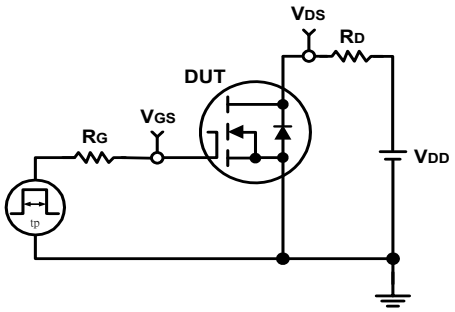
P Channel

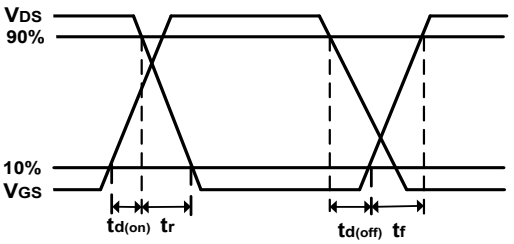




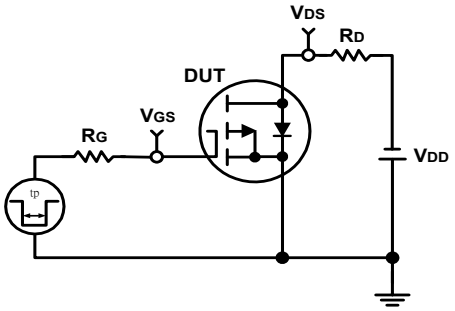
Switching Time Test Circuit and Waveforms

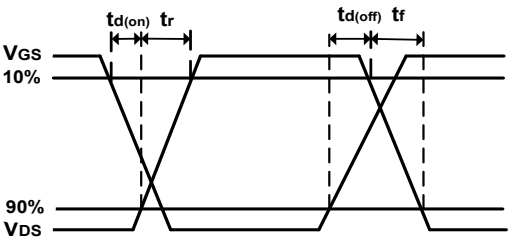
N Channel



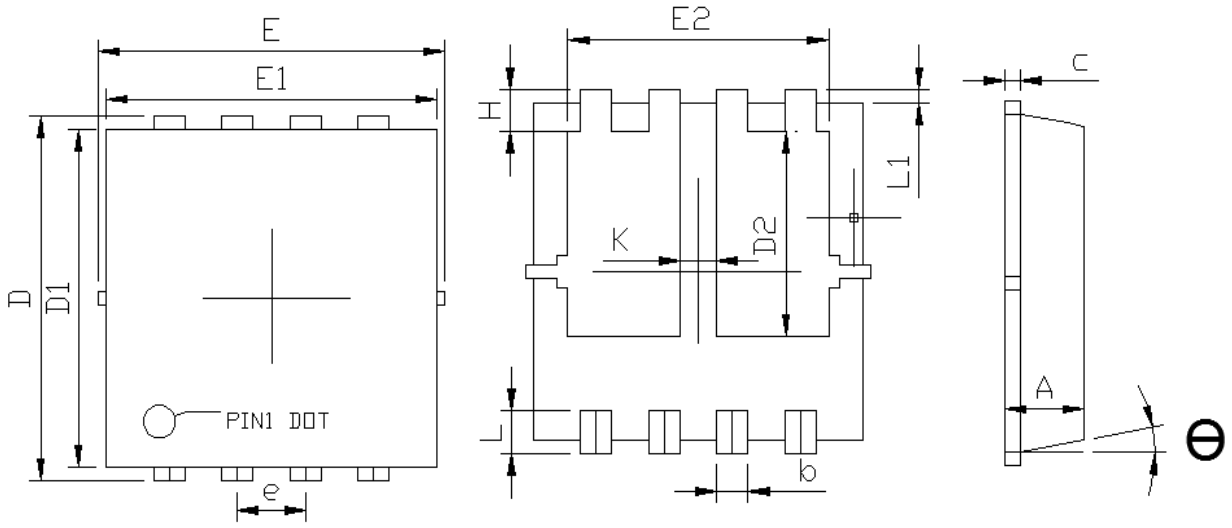


P Channel





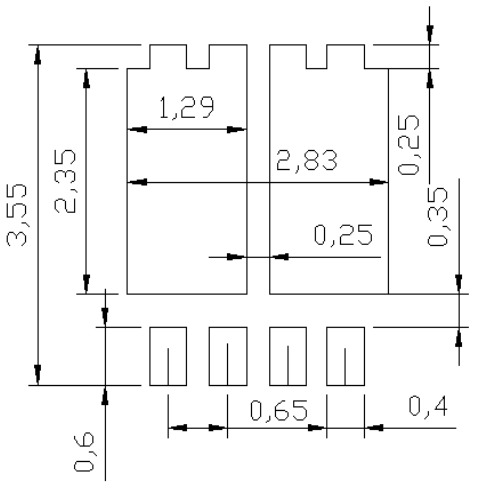
Package Information



Top View | Bottom View | Side View

SYMBOLS	DFN3.3x3.3G-8_EP2_P			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	0.80	0.028	0.031
b	0.25	0.35	0.010	0.014
c	0.10	0.25	0.004	0.010
D	3.25	3.45	0.128	0.136
D1	3.00	3.20	0.118	0.126
D2	1.78	1.98	0.070	0.078
E	3.00	3.40	0.118	0.134
E1	3.00	3.20	0.118	0.126
E2	2.39	2.59	0.094	0.102
e	0.65BSC		0.026 BSC	
H	0.30	0.50	0.012	0.020
L	0.30	0.50	0.012	0.020
L1	0.13 REF		0.005 REF	
K	0.30	-	0.012	-
θ	-	12°	-	12°

RECOMMENDED LAND PATTERN



UNIT: mm