

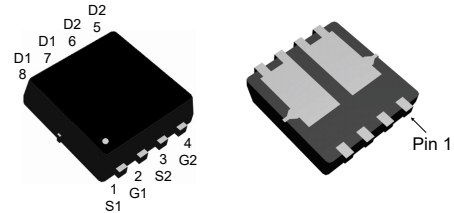
Features

- N Channel : 30V/31A,
 $R_{DS(ON)}=7m\Omega(\text{typ.})@V_{GS}=10V$
 $R_{DS(ON)}=10m\Omega(\text{typ.})@V_{GS}=4.5V$
- P Channel : -30V/-30A,
 $R_{DS(ON)}=12m\Omega(\text{typ.})@V_{GS}=-10V$
 $R_{DS(ON)}=16m\Omega(\text{typ.})@V_{GS}=-4.5V$
- 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)

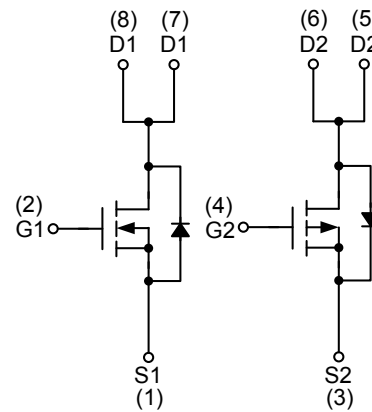
Applications

- Synchronous Rectification.
- Motor Control.
- High Current, High Speed Switching.
- Portable equipment application.

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		30	-30	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	31	-30	A
I _D ^a	Continuous Drain Current	T _C =25°C	31	-30	A
		T _C =100°C	24	-23	A
I _{DM} ^a	Pulse Drain Current Tested	T _C =25°C	93	-90	A
P _D	Maximum Power Dissipation	T _C =25°C	21	25	W
		T _C =100°C	8.3	10	
R _{θJC}	Thermal Resistance-Junction to Case		6	5	°C/W
R _{θJA} ^c	Thermal Resistance-Junction to Ambient	Steady State	95		°C/W
I _{AS} ^b	Avalanche Current, Single pulse	L=0.1mH	19	-23	A
E _{AS} ^b	Avalanche Energy, Single pulse	L=0.1mH	18	26	mJ

Note * : Calculated continuous current based on maximum allowable junction temperature. Bonding wire limitation current is 8A.

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_J=25°C).

Note c : Surface Mounted on 1in² pad area.

N Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ 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	30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1.0	1.6	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	-	7	10	mΩ
		V _{GS} =4.5V, I _{DS} =7A	-	10	13	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =8A, V _{GS} =0V	-	0.82	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =8A, dI _{SD} /dt=100A/μs	-	11.8	-	ns
Q _{rr}	Reverse Recovery Charge		-	5	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	2.1	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	-	833	1083	pF
C _{oss}	Output Capacitance		-	130	-	
C _{rss}	Reverse Transfer Capacitance		-	73	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	8	15	ns
t _r	Turn-on Rise Time		-	9.4	17	
t _{d(OFF)}	Turn-off Delay Time		-	23.4	43	
t _f	Turn-off Fall Time		-	5.2	10	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =8A	-	15.3	21.4	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =8A	-	7	-	
Q _{gs}	Gate-Source Charge		-	2.9	-	
Q _{gd}	Gate-Drain Charge		-	2.4	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Note e : Guaranteed by design, not subject to production testing.

P Channel Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

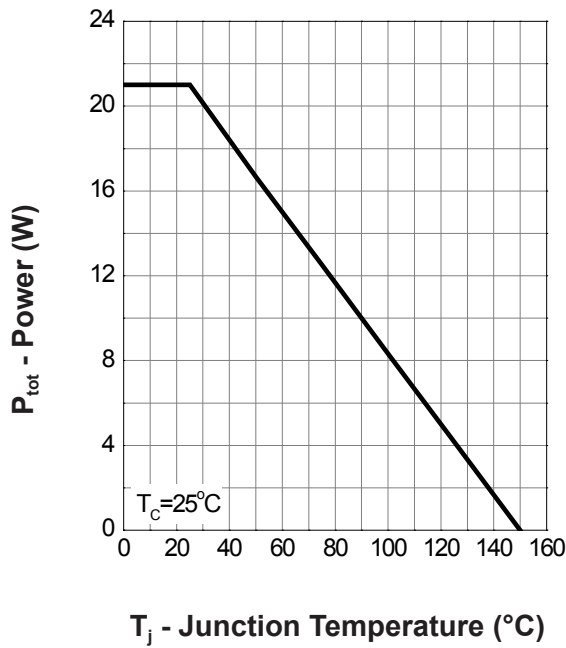
Symbol	Parameter	Test Conditions	P Channel			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =-250μA	-30	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-24V, V _{GS} =0V	-	-	-1	μA
		T _J =85°C	-	-	-30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	-1.0	-1.5	-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} =-6A	-	12	15	mΩ
		V _{GS} =-4.5V, I _{DS} =-4A	-	16	19	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =-4A, V _{GS} =0V	-	-0.8	-1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} =-6A, dI _{SD} /dt=100A/μs	-	19	-	ns
Q _{rr}	Reverse Recovery Charge		-	10	-	nC
Dynamic Characteristics ^e						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	7	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, Frequency=1.0MHz	-	1270	1650	pF
C _{oss}	Output Capacitance		-	255	-	
C _{rss}	Reverse Transfer Capacitance		-	165	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-15V, R _L =-15Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	11	20	ns
t _r	Turn-on Rise Time		-	11	20	
t _{d(OFF)}	Turn-off Delay Time		-	81	146	
t _f	Turn-off Fall Time		-	50	90	
Gate Charge Characteristics ^e						
Q _g	Total Gate Charge	V _{DS} =-15V, V _{GS} =-4.5V, I _{DS} =-6A	-	13.8	-	nC
Q _g	Total Gate Charge	V _{DS} =-15V, V _{GS} =-10V, I _{DS} =-6A	-	28	39	
Q _{gs}	Gate-Source Charge		-	4.6	-	
Q _{gd}	Gate-Drain Charge		-	6.6	-	

Note d : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

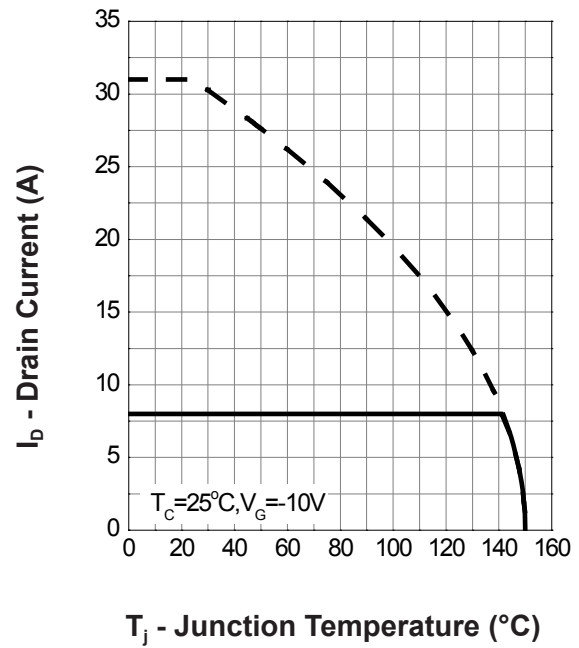
Note e : Guaranteed by design, not subject to production testing.

N Channel Typical Operating Characteristics

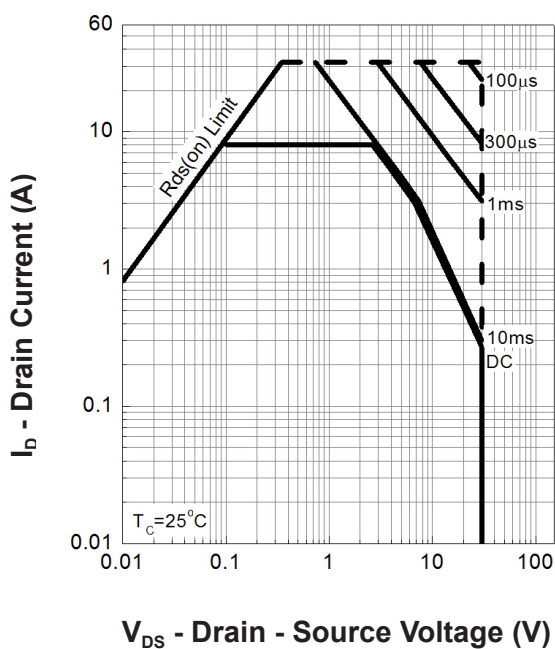
Power Dissipation



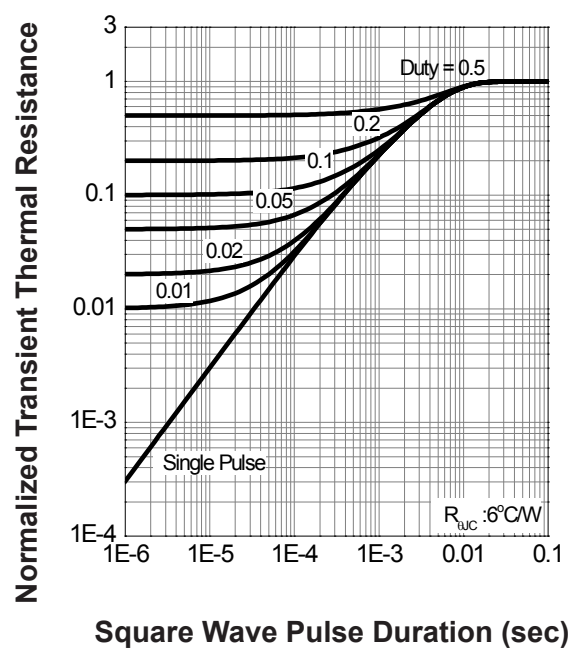
Drain Current



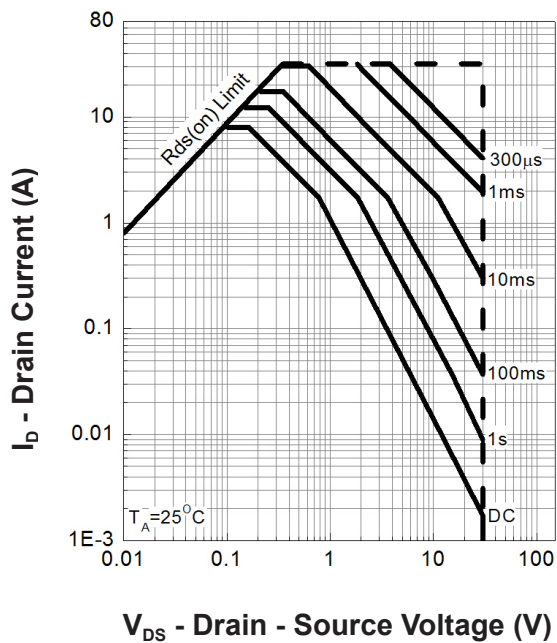
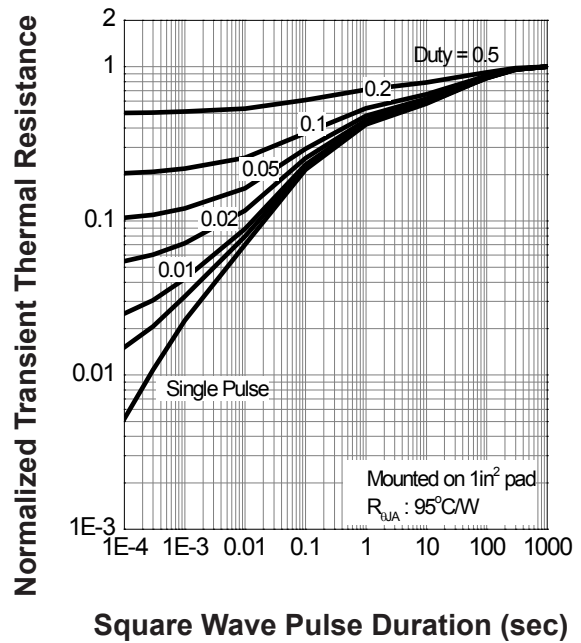
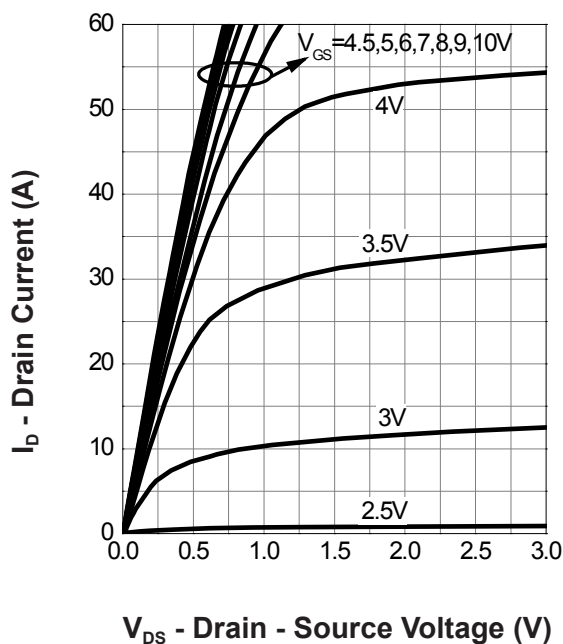
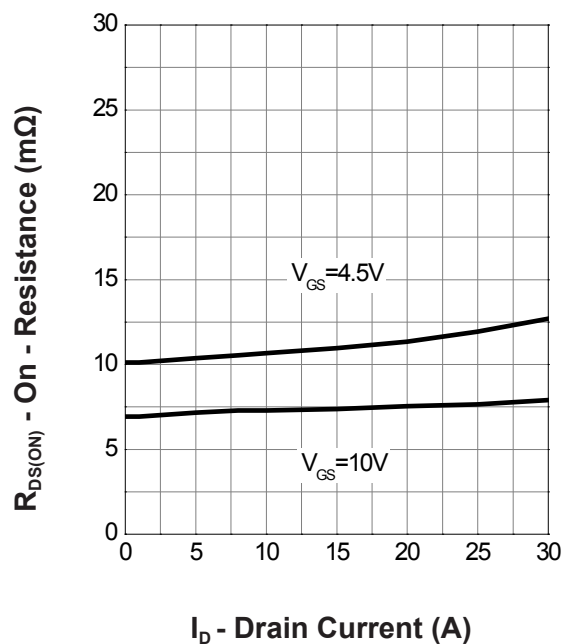
Safe Operation Area



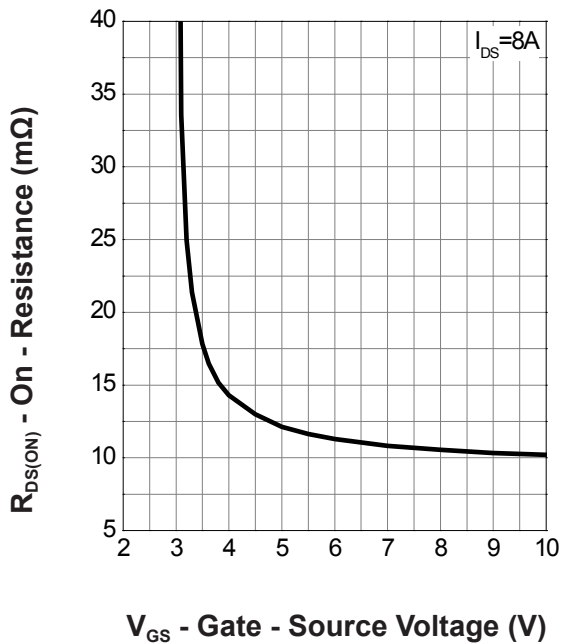
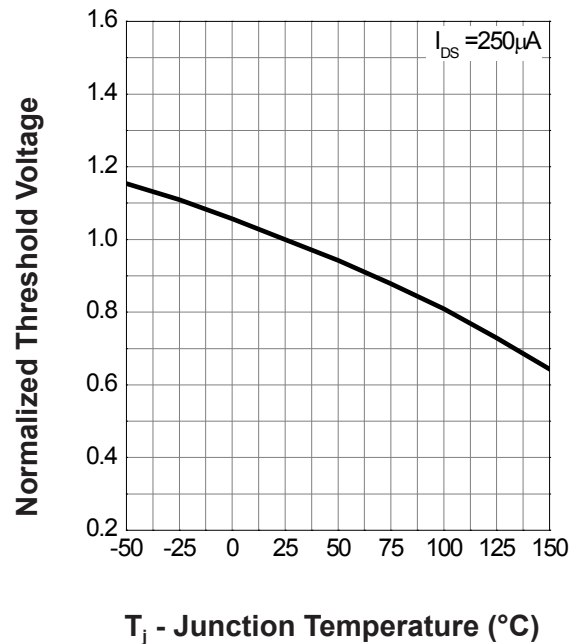
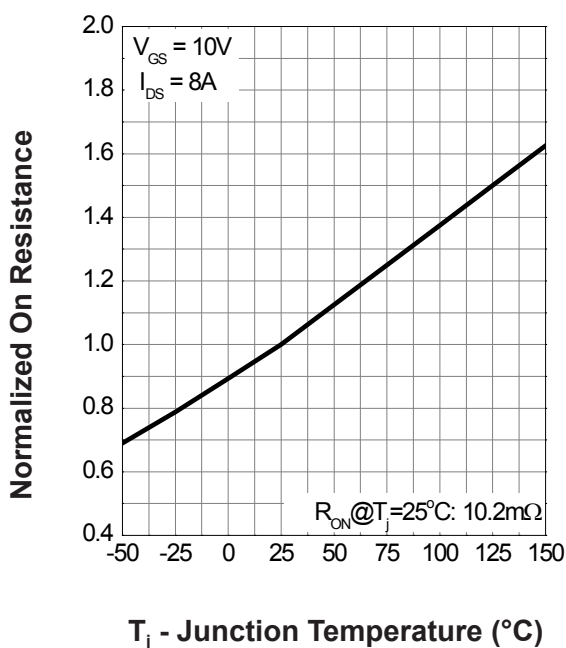
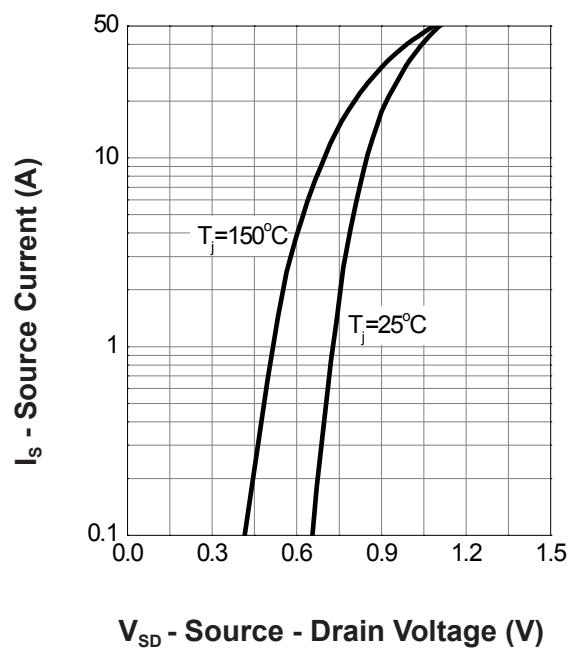
Thermal Transient Impedance



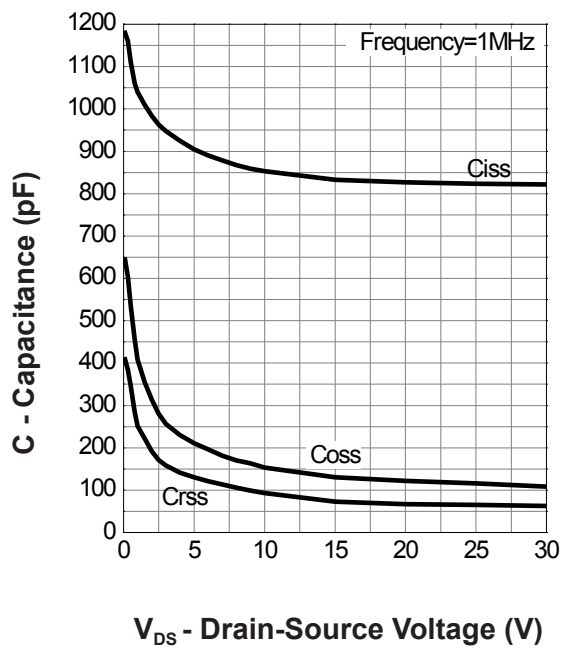
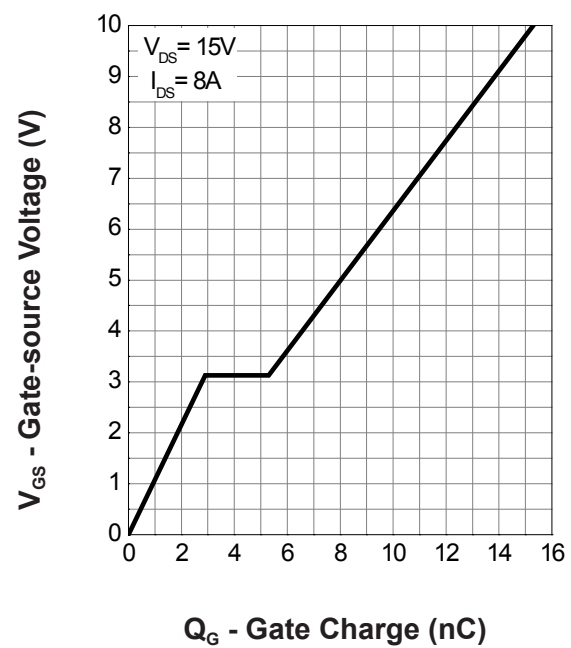
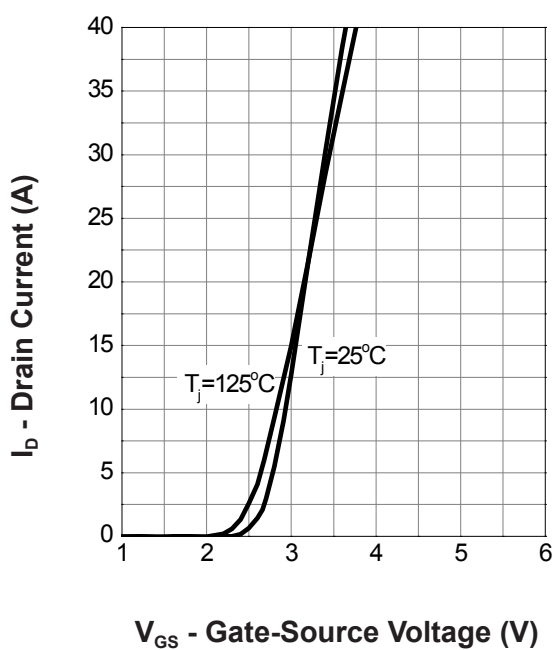
N Channel Typical Operating Characteristics(Cont.)

Safe Operation Area

Thermal Transient Impedance

Output Characteristics

Drain-Source On Resistance


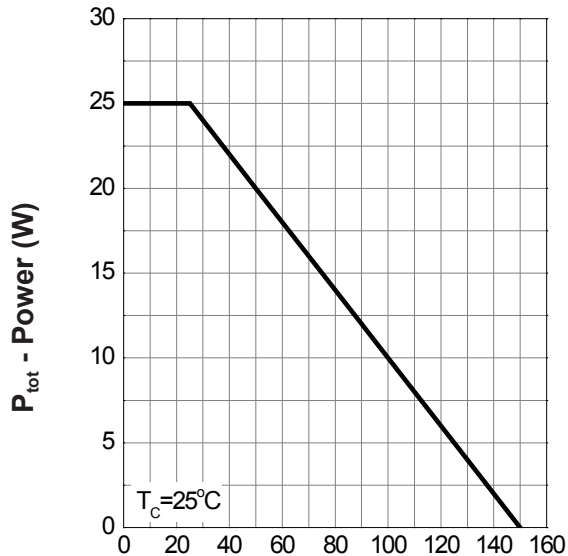
N Channel Typical Operating Characteristics(Cont.)

Gate-Source On Resistance

Gate Threshold Voltage

Drain-Source On Resistance

Source-Drain Diode Forward


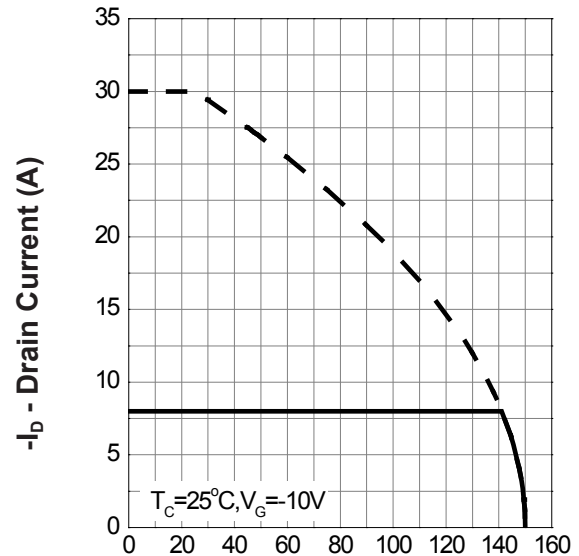
N Channel Typical Operating Characteristics(Cont.)

Capacitance

Gate Charge

Transfer Characteristics


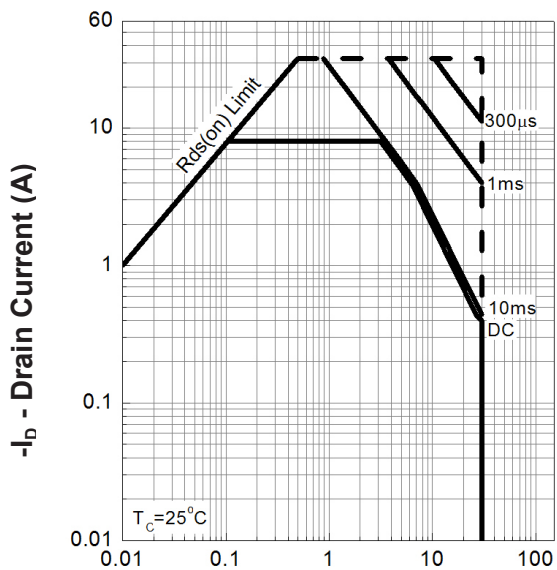
P Channel Typical Operating Characteristics

Power Dissipation


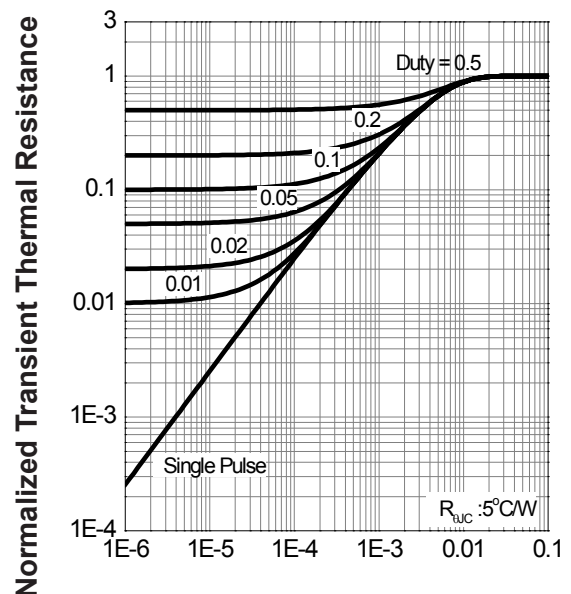
T_j - Junction Temperature ($^{\circ}\text{C}$)

Drain Current


T_j - Junction Temperature ($^{\circ}\text{C}$)

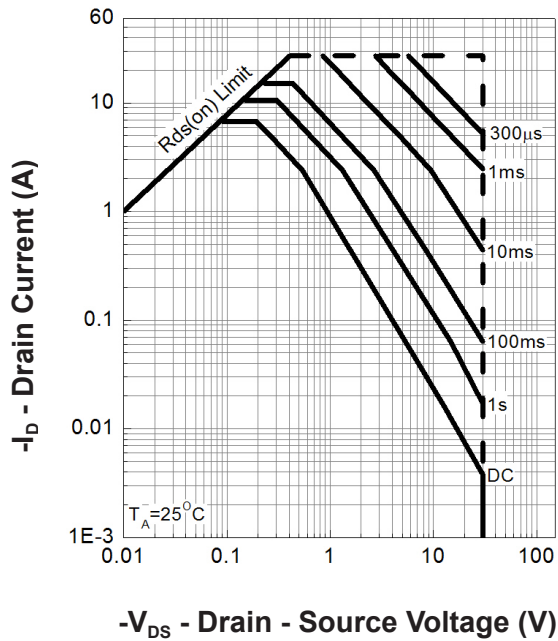
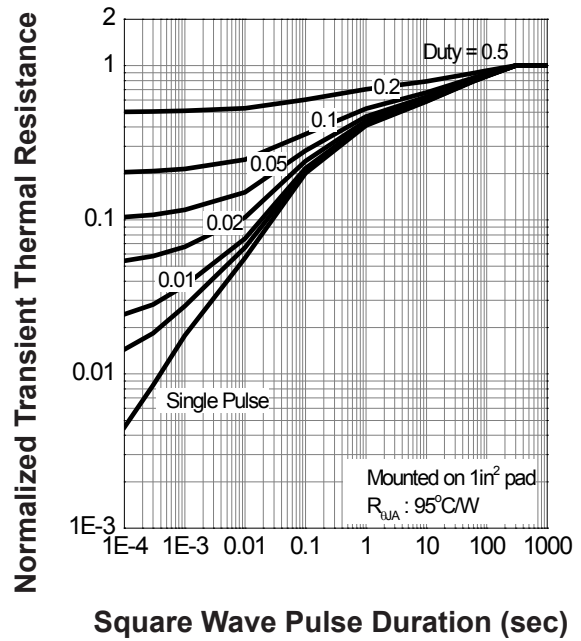
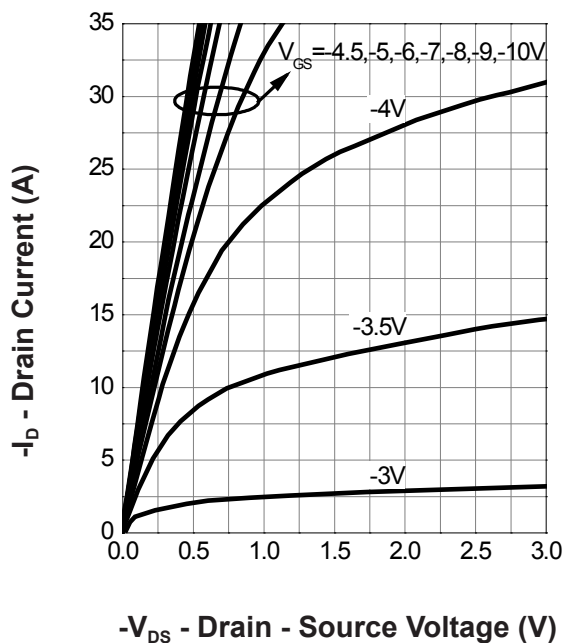
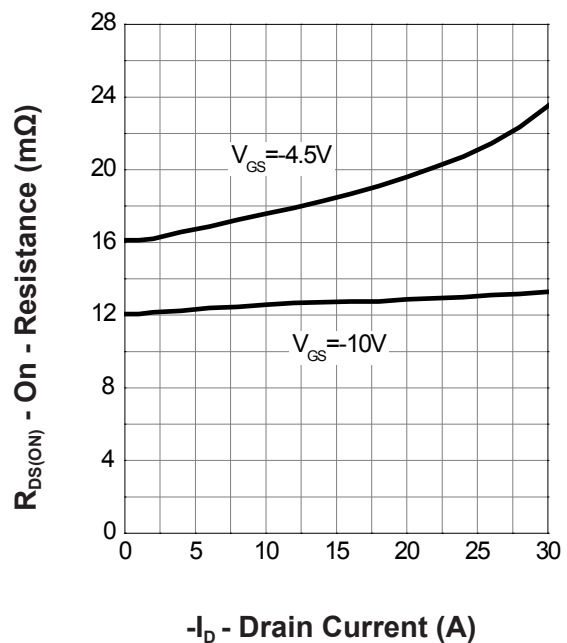
Safe Operation Area


$-V_{DS}$ - Drain - Source Voltage (V)

Thermal Transient Impedance


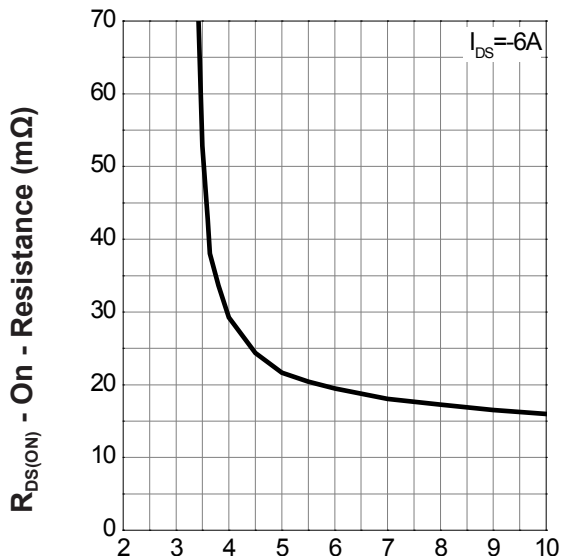
Square Wave Pulse Duration (sec)

P Channel Typical Operating Characteristics(Cont.)

Safe Operation Area

Thermal Transient Impedance

Output Characteristics

Drain-Source On Resistance


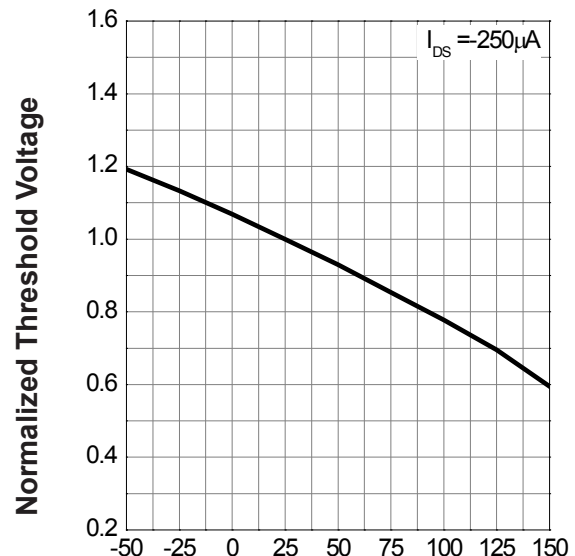
P Channel Typical Operating Characteristics(Cont.)

Gate-Source On Resistance



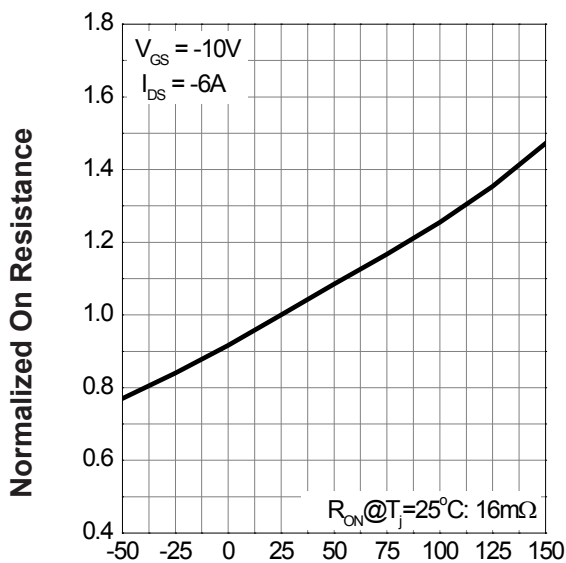
$-V_{GS}$ - Gate - Source Voltage (V)

Gate Threshold Voltage



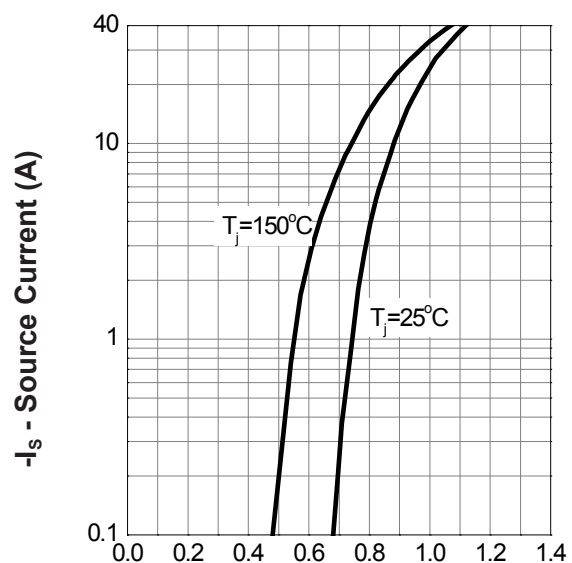
T_J - Junction Temperature ($^{\circ}C$)

Drain-Source On Resistance



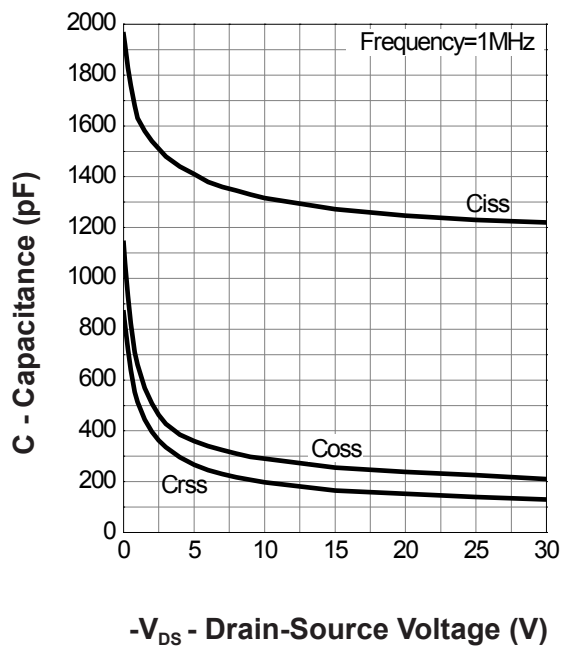
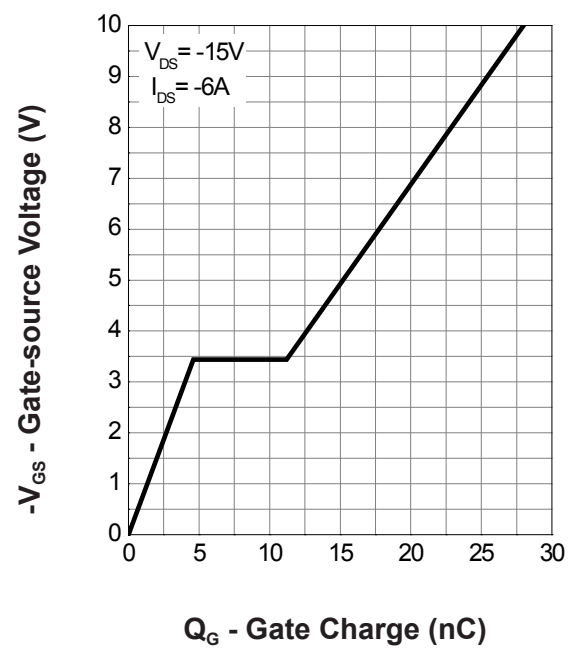
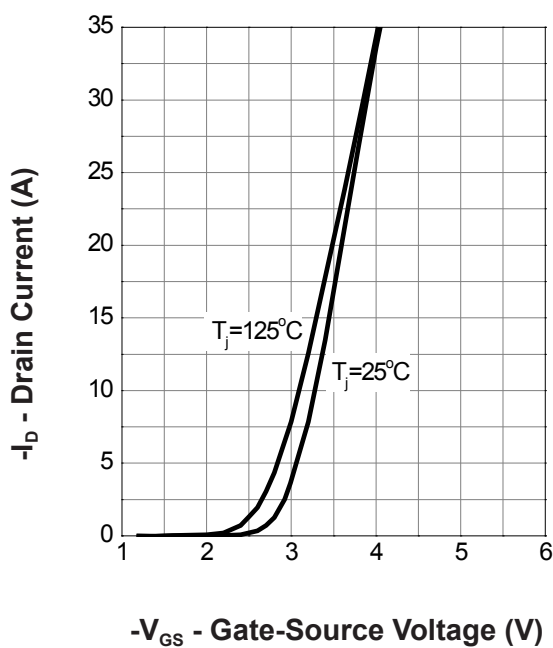
T_J - Junction Temperature ($^{\circ}C$)

Source-Drain Diode Forward



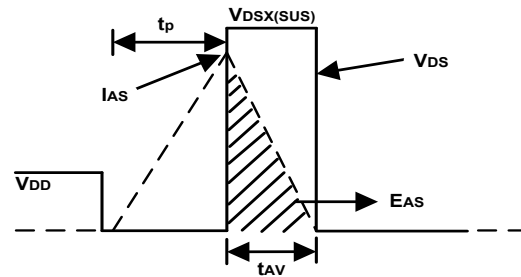
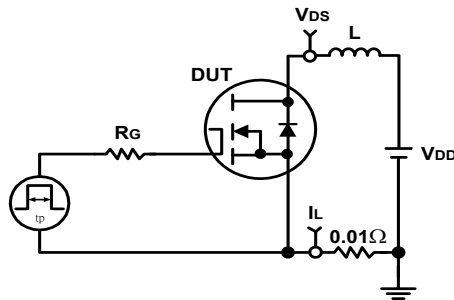
$-V_{SD}$ - Source - Drain Voltage (V)

P Channel Typical Operating Characteristics(Cont.)

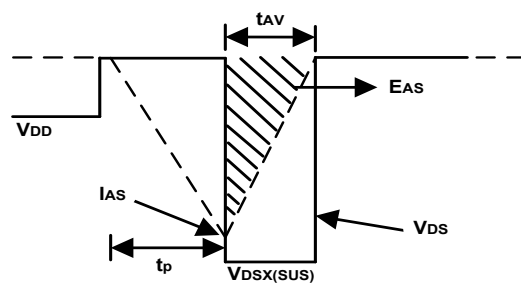
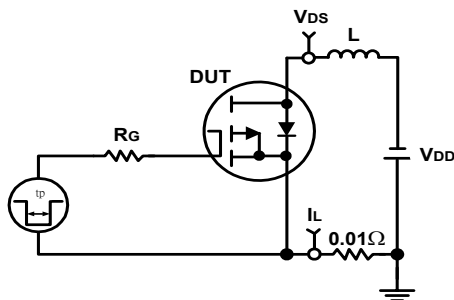
Capacitance

Gate Charge

Transfer Characteristics


Avalanche Test Circuit and Waveforms

N Channel

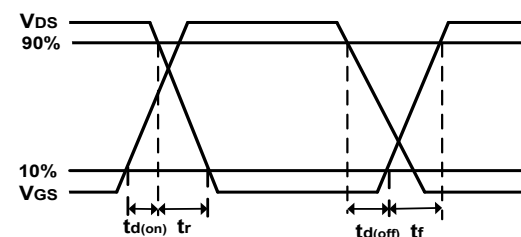
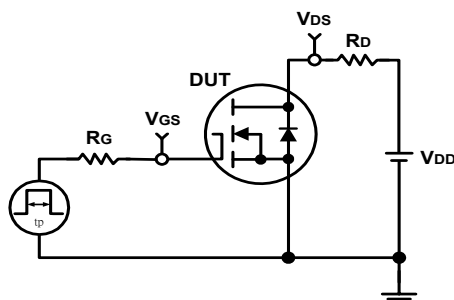


P Channel

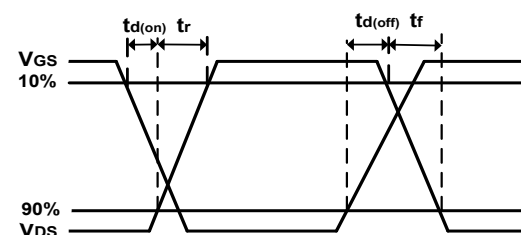
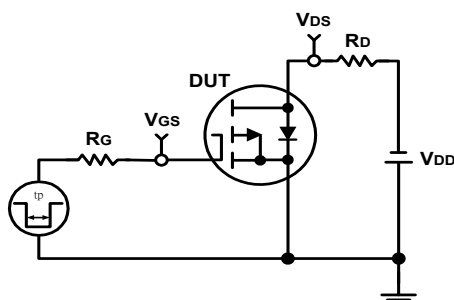


Switching Time Test Circuit and Waveforms

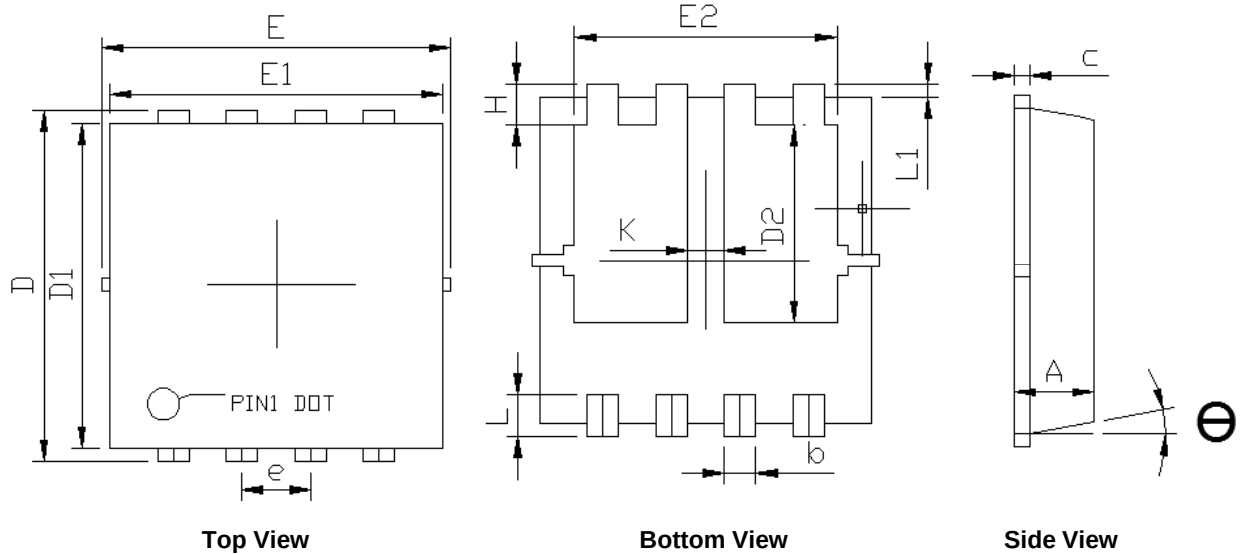
N Channel



P Channel

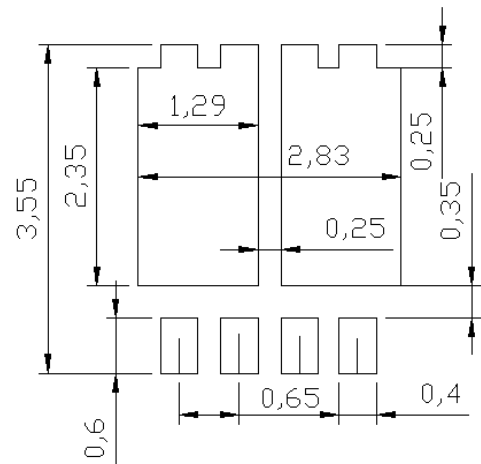


DFN3.3x3.3-8L_EP2_P



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	3.20	3.40	0.126	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