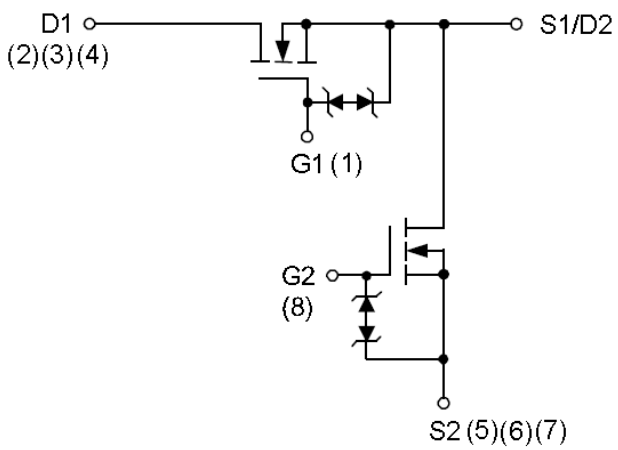
Dual N-Channel Enhancement Mode MOSFET TDM3412

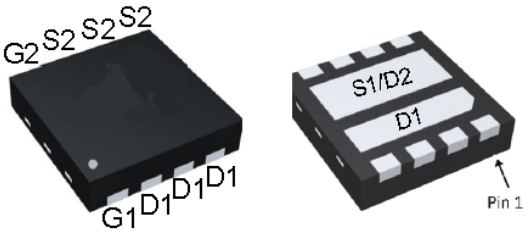
DESCRIPTION

The TDM3412 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.



GENERAL FEATURES

- Channel 1
  RDS(ON) < 17.5mΩ @ VGS=4.5V
- RDS(ON) < 10.8mΩ @ VGS=10V
- Channel 2
  RDS(ON) < 16mΩ @ VGS=4.5V
  RDS(ON) < 10mΩ @ VGS=10V
- High Power and current handling capability
- ESD protection
- Lead free product is available
- Surface Mount Package



DFN3x3E-8_EP2

Application

- PWM applications
- Load switch
- Power management

ABSOLUTE MAXIMUM RATINGS(T_A=25℃unless otherwise noted)

Parameter	Symbol	Channel 1	Channel 2	Unit
Drain-Source Voltage	V_{DS}	30	30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Diode Continuous Forward Current	Is(T_C=25℃)	5	5	A
Continuous Drain Current(note1)	I_D(T_C=25℃)	18	18	A
Pulse Drain Current Tested(note4)	I_{DP}(T_C=25℃)	45	45	A
Maximum Power Dissipation	P_D(T_C=25℃)	20	20	W
Continuous Drain Current	I_D (T_A=25℃)	8.4	9.1	A
	I_D (T_A=70℃)	6.7	7.3	
Pulse Drain Current Tested	I_{DP}(T_A=25℃)	33.5	36	A
Maximum Power Dissipation	P_D(T_A=25℃)	1.14	1.13	W
Thermal Resistance-Junction to Ambient(note 5)	$R_{\theta JA}$(t≤10s)	66	60	℃/W
	$R_{\theta JA}$(Steady State)	110	100	
Thermal Resistance-Junction to Case	$R_{\theta JC}$(Steady State)	6	6	℃/W
Maximum Operating Junction Temperature	T_J	150		℃
Storage Temperature Range	T_{STG}	-55 To 150		℃

ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Channel1			Unit
			Min	Typ	Max	
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±10	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1.4	1.8	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	9	10.8	mΩ
		V_{GS}=4.5V, I_D=8A	-	13.5	17.5	mΩ
DYNAMIC CHARACTERISTICS (Note3)						
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.35	2.5	Ω
Input Capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	450	600	PF
Output Capacitance	C_{oss}		-	318	-	PF
Reverse Transfer Capacitance	C_{rss}		-	22	-	PF
SWITCHING CHARACTERISTICS (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=15V, R_L=15 Ω, V_{GEN}=10V,	-	8.5	16	nS
Turn-on Rise Time	t_r	R_G=6 Ω I_D=1A	-	10	18	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	26	nS
Turn-Off Fall Time	t_f		-	10.6	19	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=10A,V_{GS}=10V	-	8	12	nC
Gate-Source Charge	Q_{gs}		-	1.6	-	nC
Gate-Drain Charge	Q_{gd}		-	1.2	-	nC
Body Diode Reverse Recovery Time	T_{rr}	I_{DS}=10A, dI/dt=100A/μs	-	20.5	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	7.2	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V_{SD}	V_{GS}=0V,I_S=5A	-	0.8	1.1	V

NOTES:

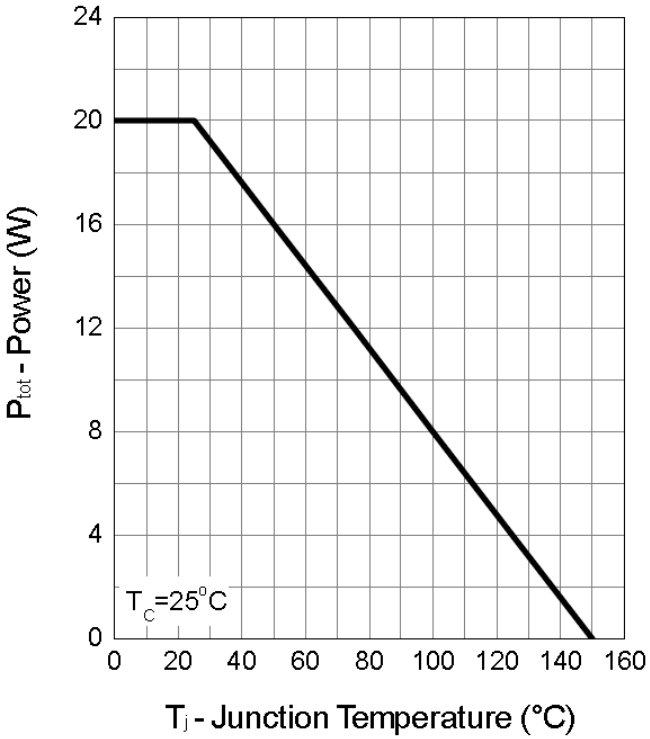
1. Max continuous current is limited by bonding wire.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production testing.
4. Pulse width is limited by max. junction temperature.
5. $R_{\theta JA}$ steady state t=999s

ELECTRICAL CHARACTERISTICS Cont.(T_A=25℃unless otherwise noted)

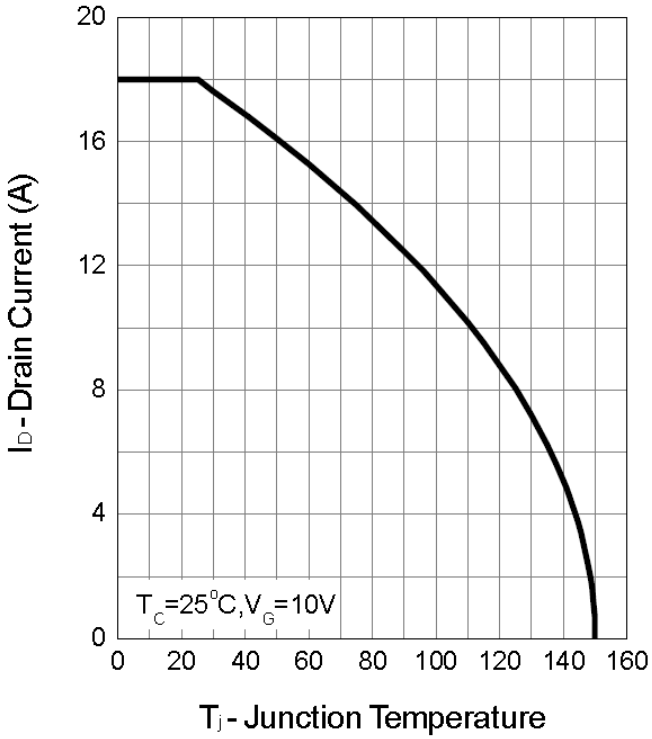
Parameter	Symbol	Condition	Channel2			Unit
			Min	Typ	Max	
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±10	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1.4	1.8	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	8.2	10	mΩ
		V_{GS}=4.5V, I_D=8A	-	12.3	16	mΩ
DYNAMIC CHARACTERISTICS (Note3)						
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.35	2.5	Ω
Input Capacitance	C_{iss}	V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	450	600	PF
Output Capacitance	C_{oss}		-	318	-	PF
Reverse Transfer Capacitance	C_{rss}		-	22	-	PF
SWITCHING CHARACTERISTICS (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=15V, R_L=15 Ω, V_{GEN}=10V,	-	8.5	16	nS
Turn-on Rise Time	t_r	R_G=6 Ω I_D=1A	-	10	18	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	26	nS
Turn-Off Fall Time	t_f		-	10.6	19	nS
Total Gate Charge	Q_g	V_{DS}=15V,I_D=10A,V_{GS}=10V	-	8	12	nC
Gate-Source Charge	Q_{gs}		-	1.6	-	nC
Gate-Drain Charge	Q_{gd}		-	1.2	-	nC
Body Diode Reverse Recovery Time	T_{rr}	I_{DS}=10A, dI/dt=100A/μs	-	20.5	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	7.2	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 2)	V_{SD}	V_{GS}=0V,I_S=5A	-	0.8	1.1	V

Channel 1 Typical Operating Characteristics

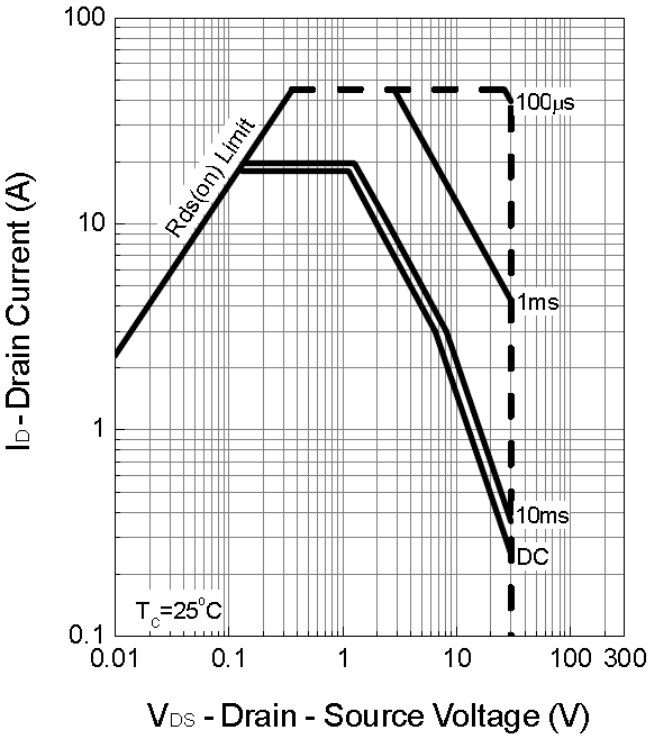
Power Dissipation



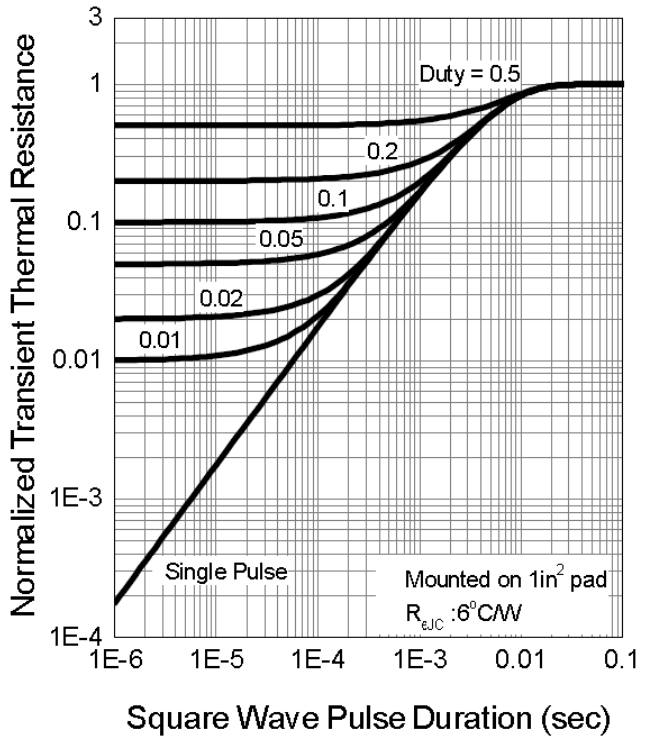
Drain Current



Safe Operation Area

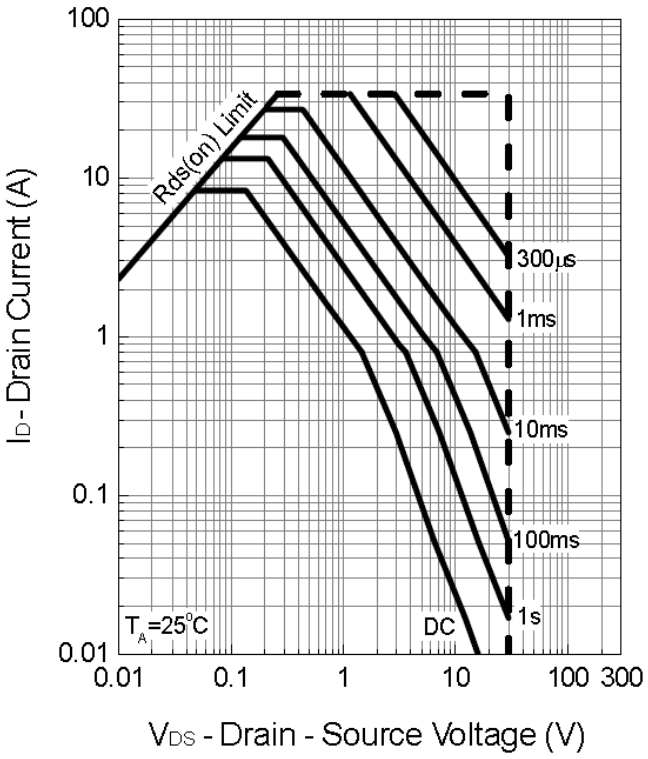


Thermal Transient Impedance

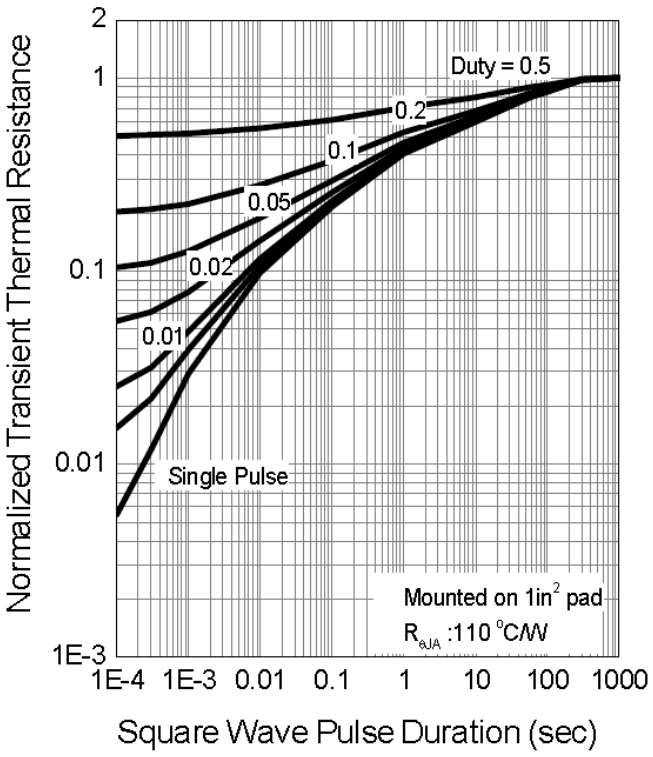


Channel 1 Typical Operating Characteristics(Cont.)

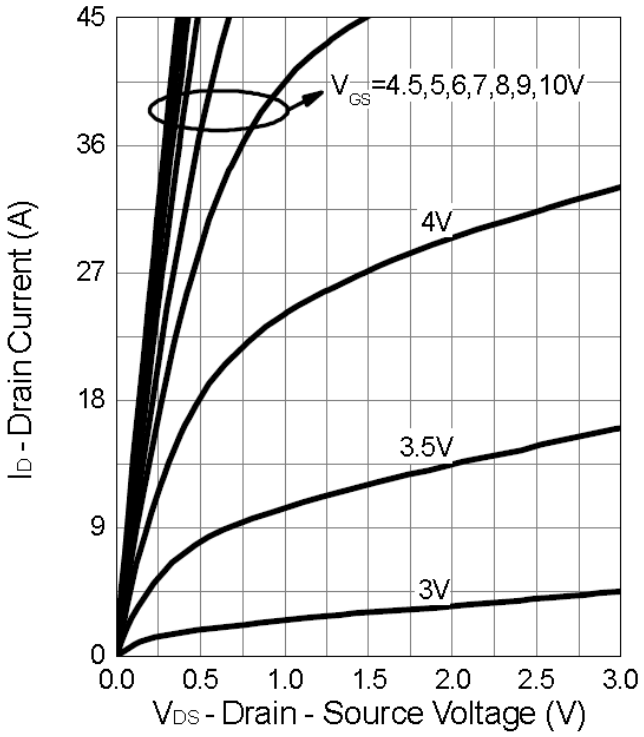
Safe Operation Area



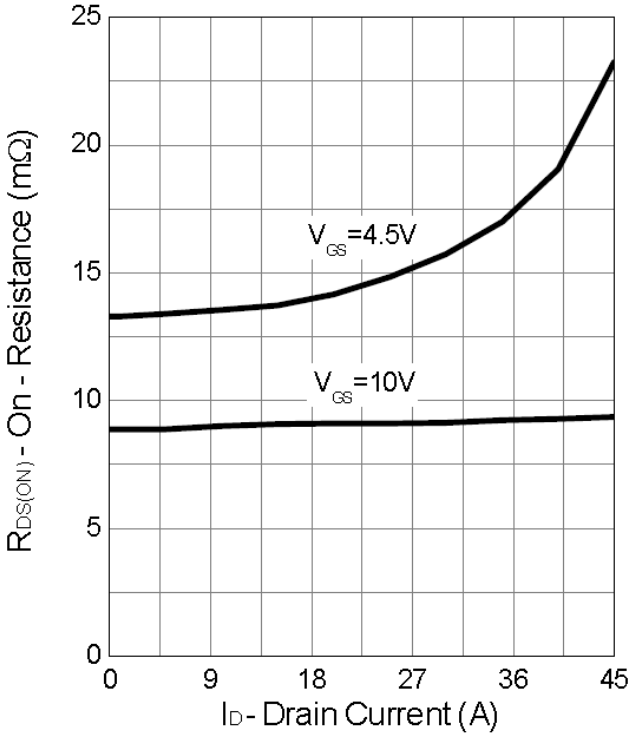
Thermal Transient Impedance



Output Characteristics

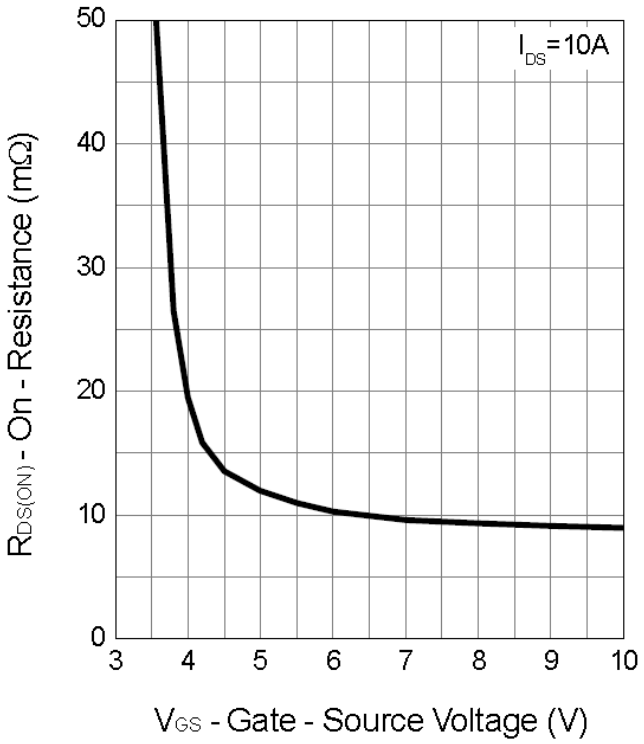


Drain-Source On Resistance

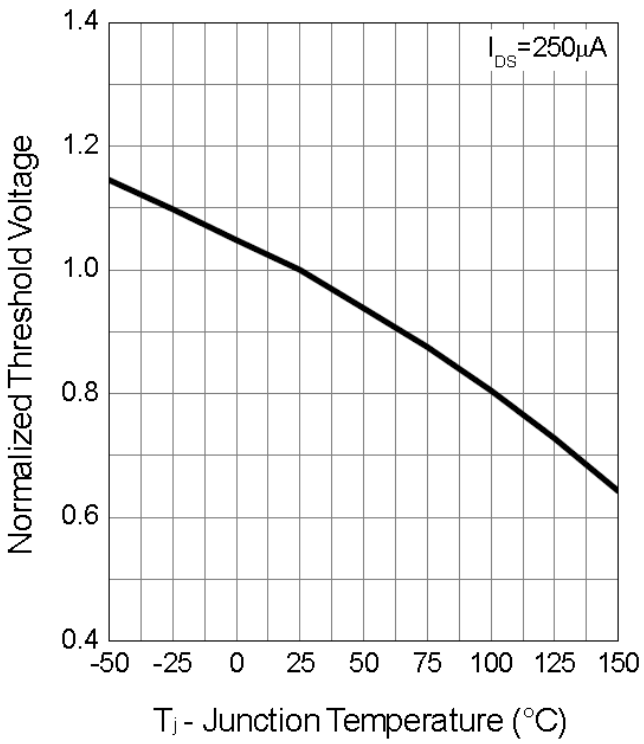


Channel 1 Typical Operating Characteristics (Cont.)

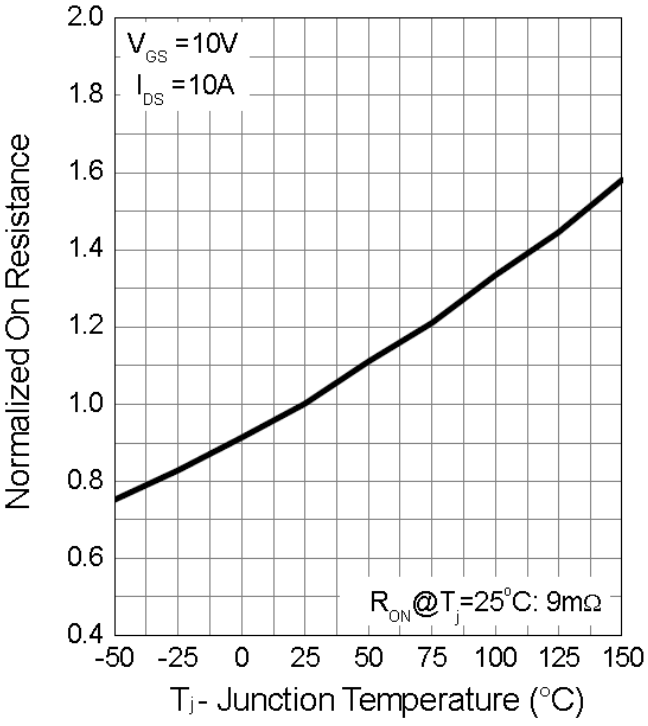
Gate-Source On Resistance



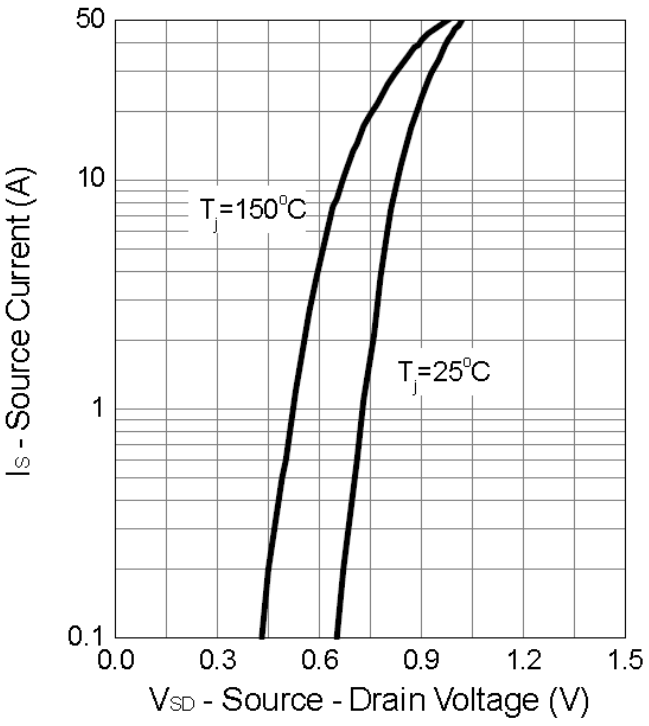
Gate Threshold Voltage



Drain-Source On Resistance

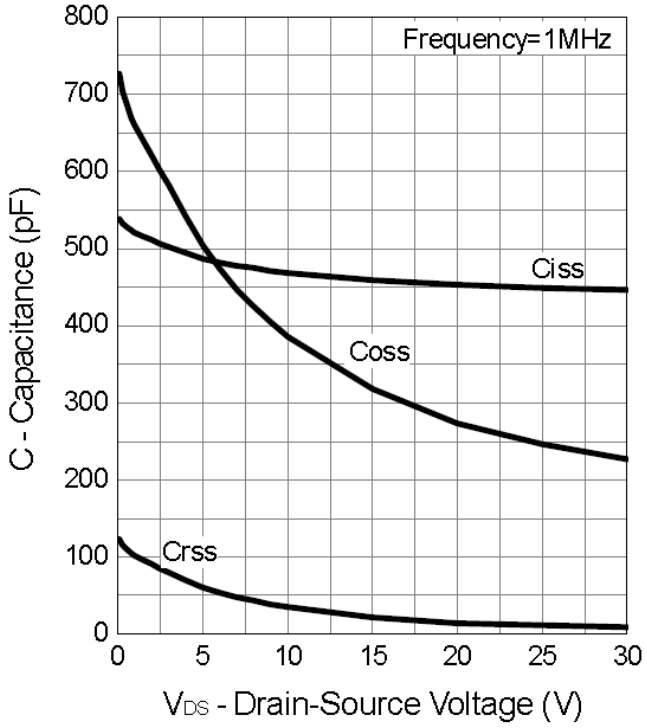


Source-Drain Diode Forward

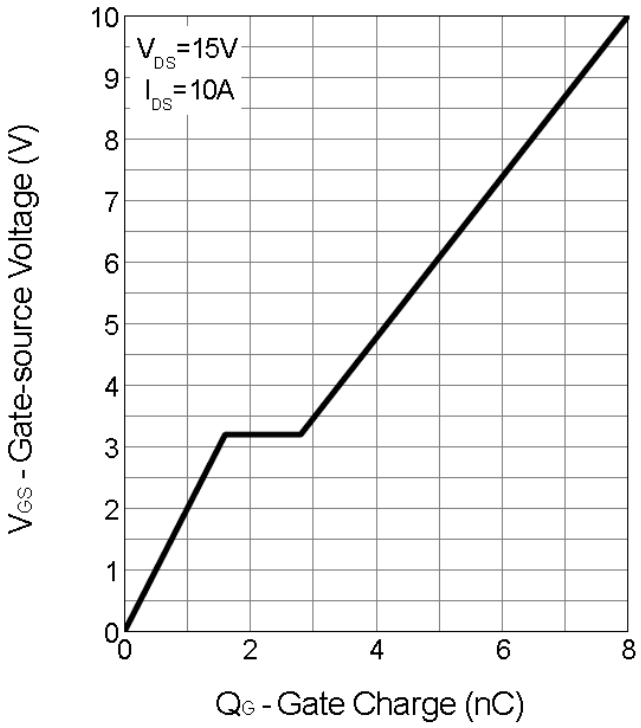


Channel 1 Typical Operating Characteristics (Cont.)

Capacitance

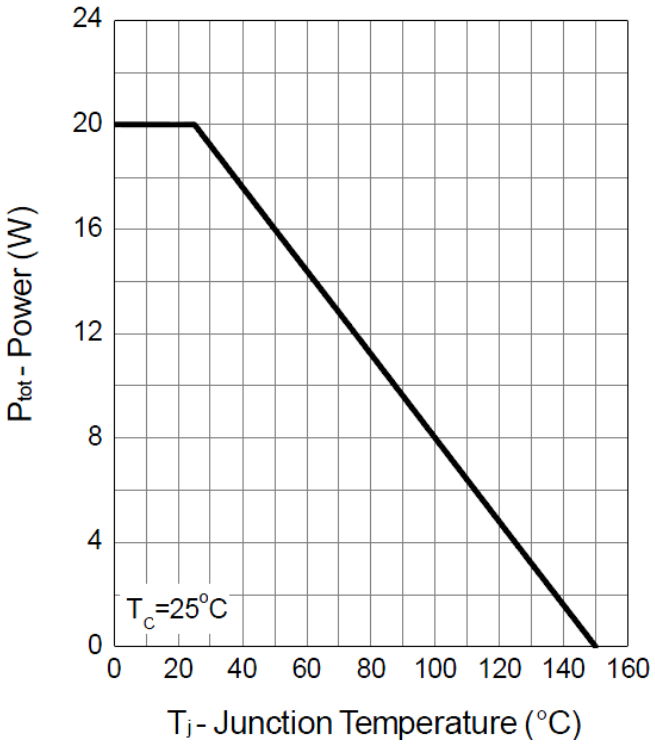


Gate Charge

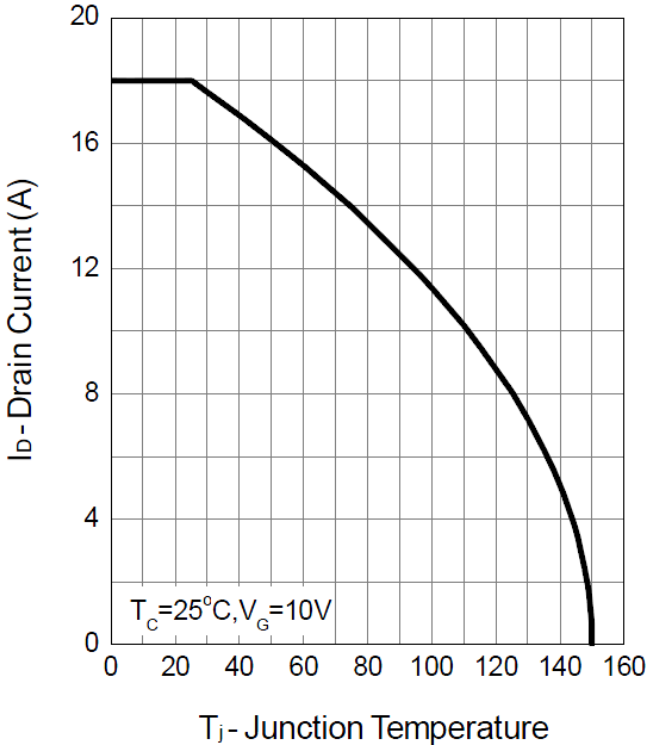


Channel 2 Typical Operating Characteristics

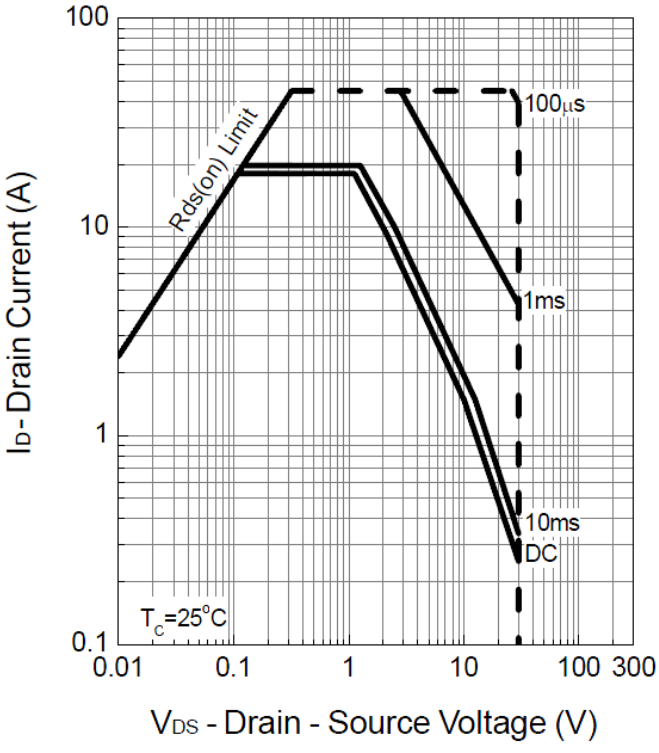
Power Dissipation



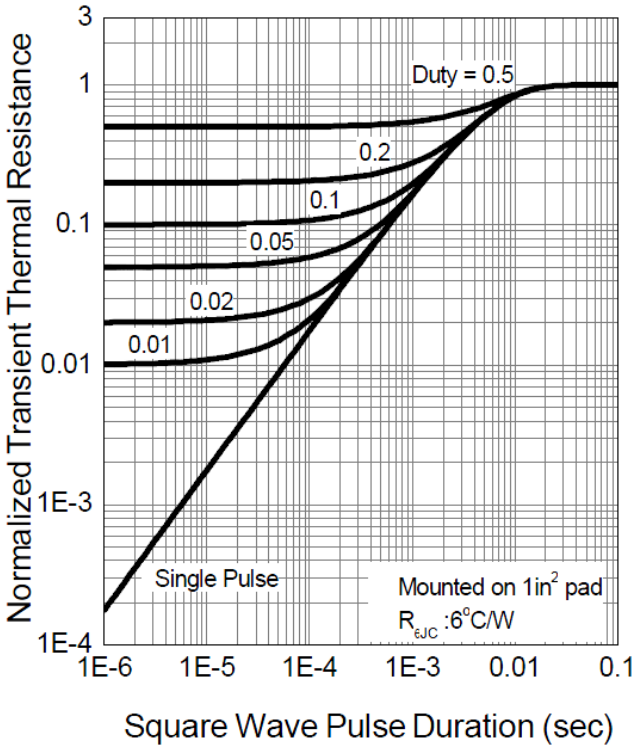
Drain Current



Safe Operation Area

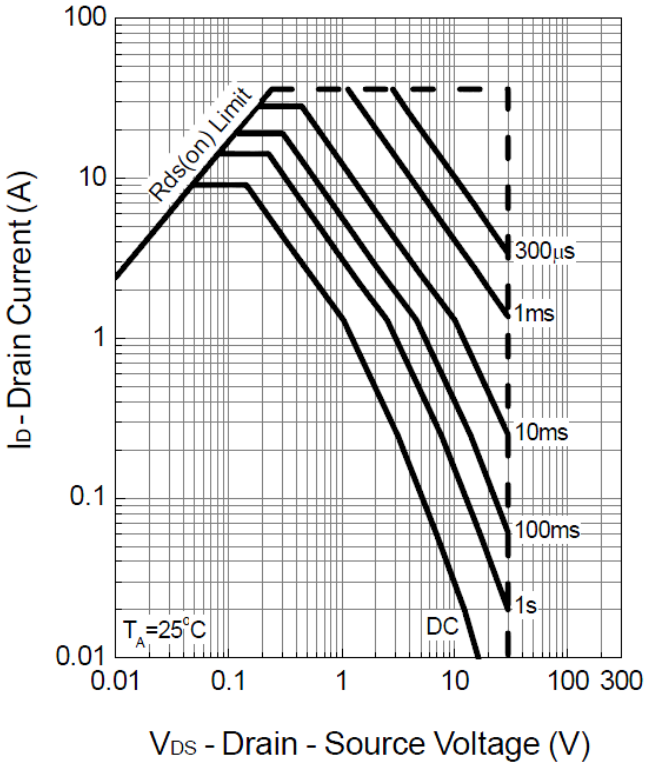


Thermal Transient Impedance

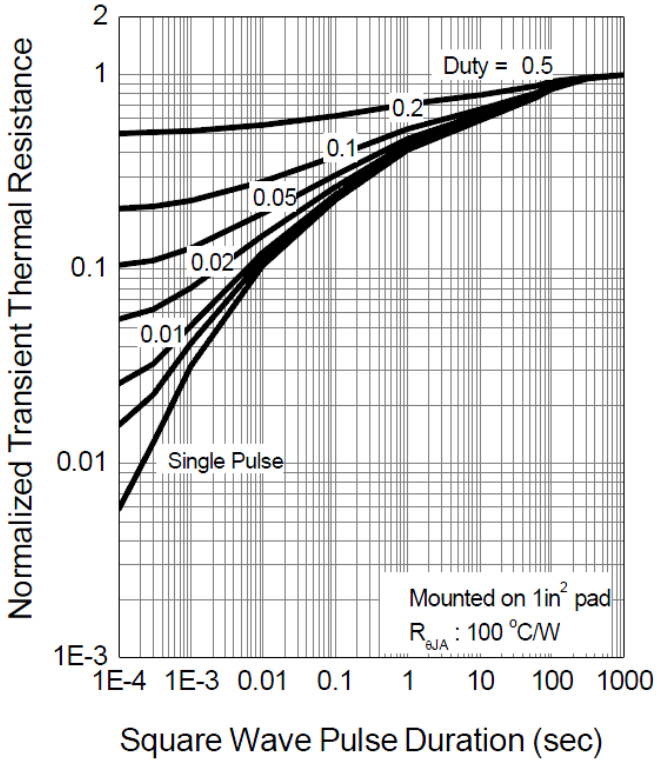


Channel 2 Typical Operating Characteristics (Cont.)

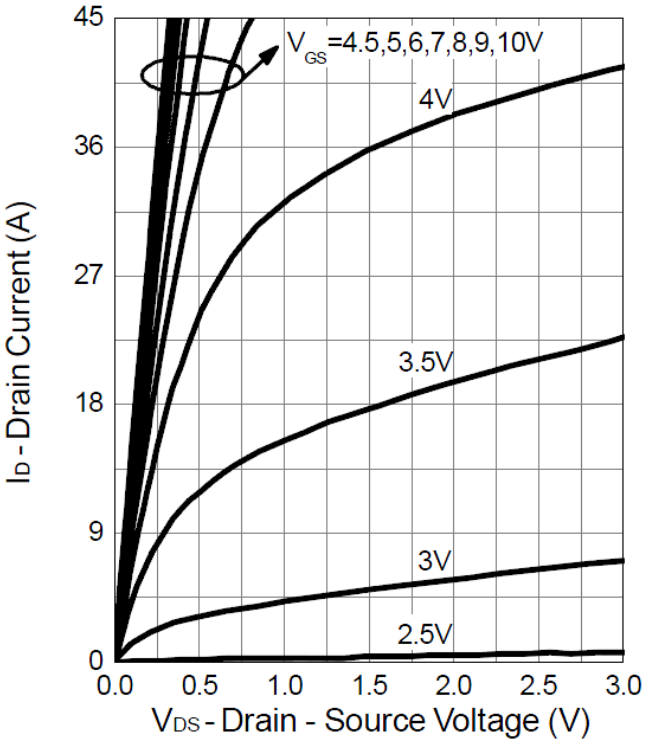
Safe Operation Area



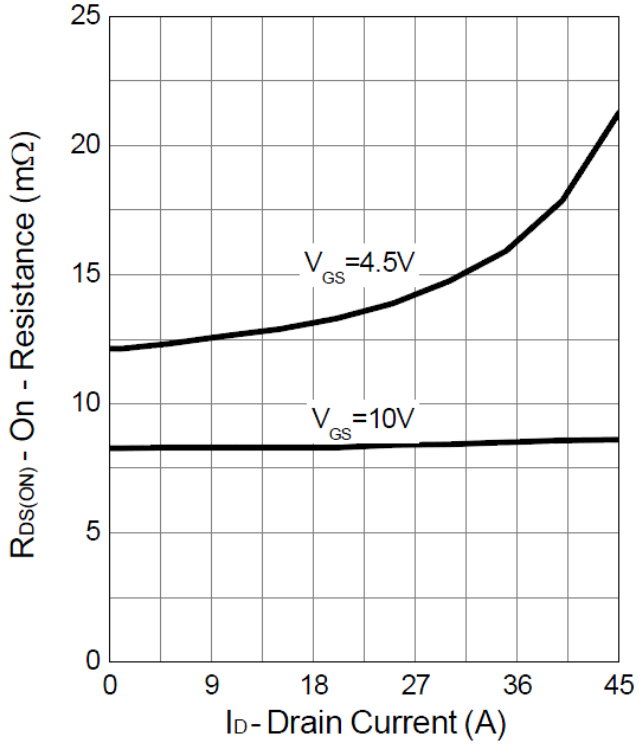
Thermal Transient Impedance



Output Characteristics

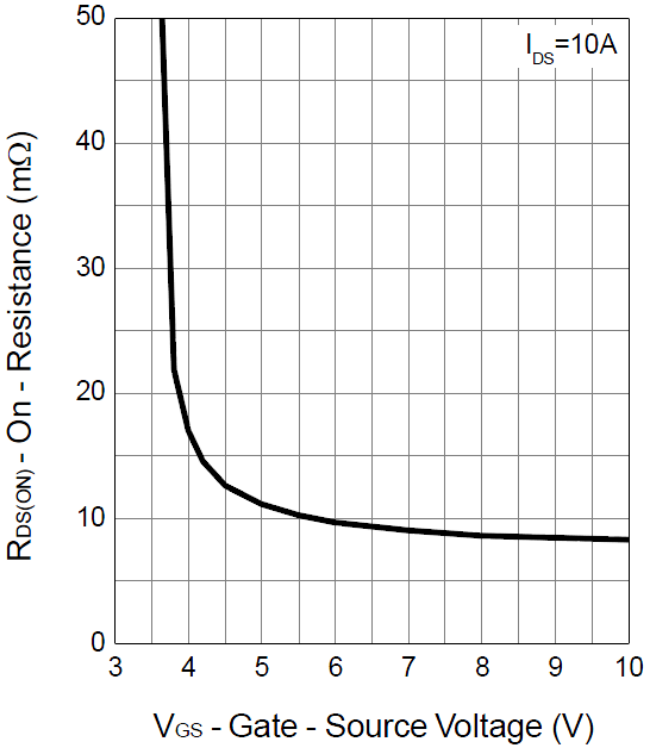


Drain-Source On Resistance

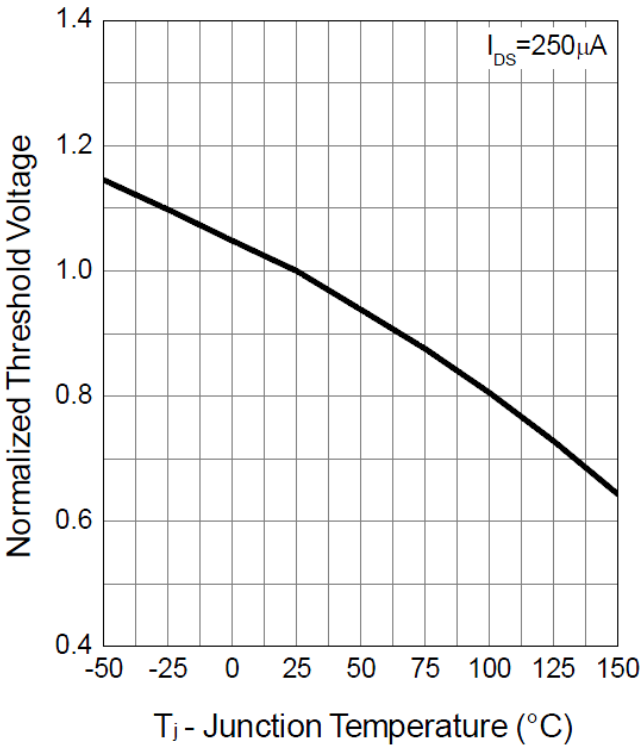


Channel 2 Typical Operating Characteristics (Cont.)

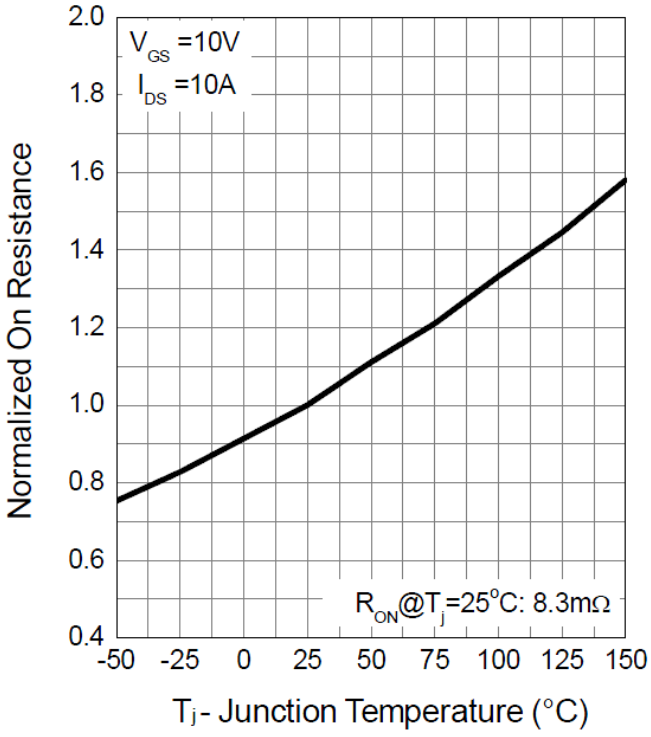
Gate-Source On Resistance



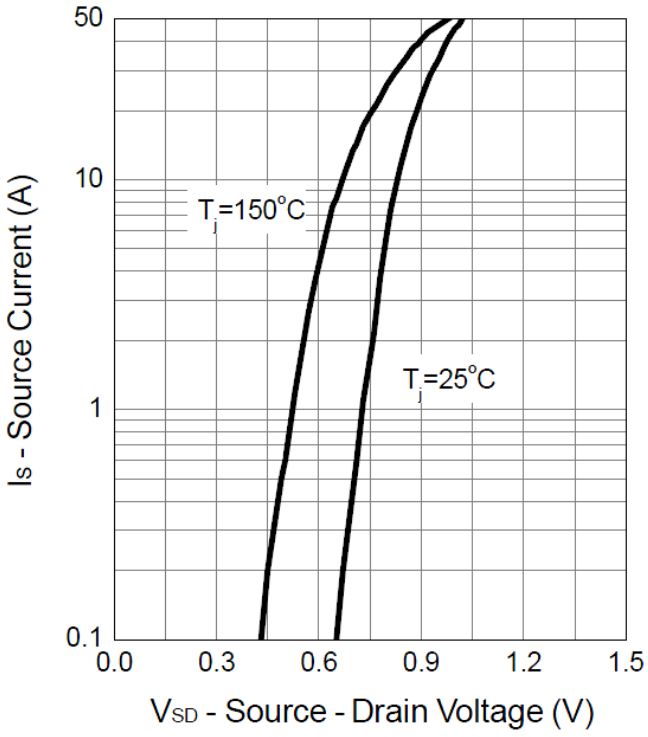
Gate Threshold Voltage



Drain-Source On Resistance

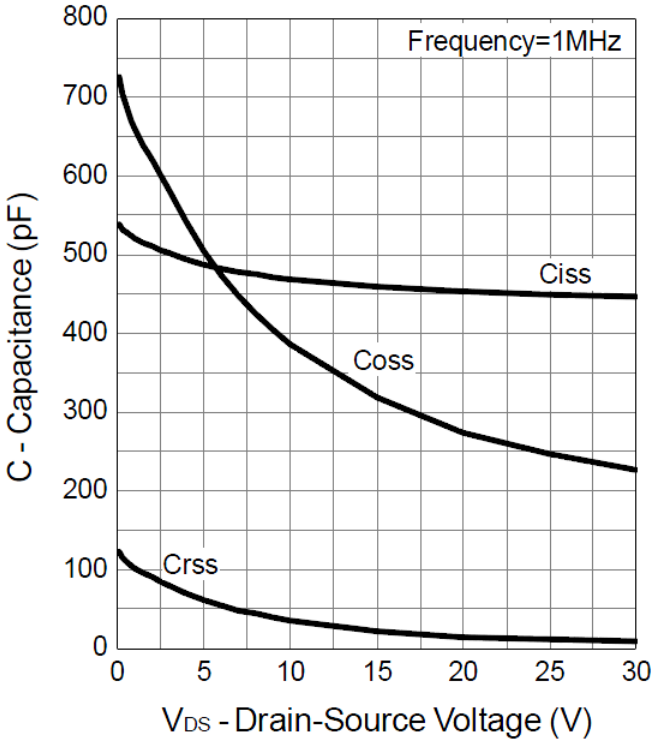


Source-Drain Diode Forward

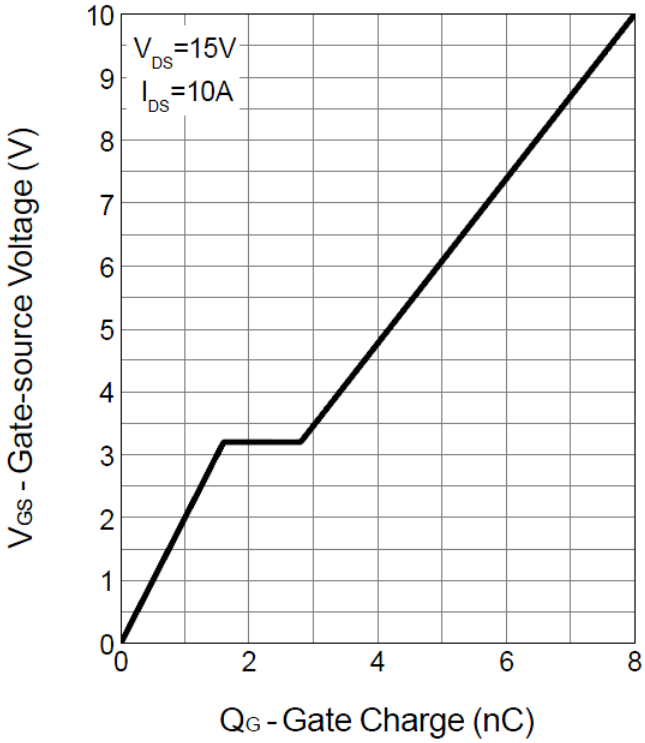


Channel 2 Typical Operating Characteristics (Cont.)

Capacitance

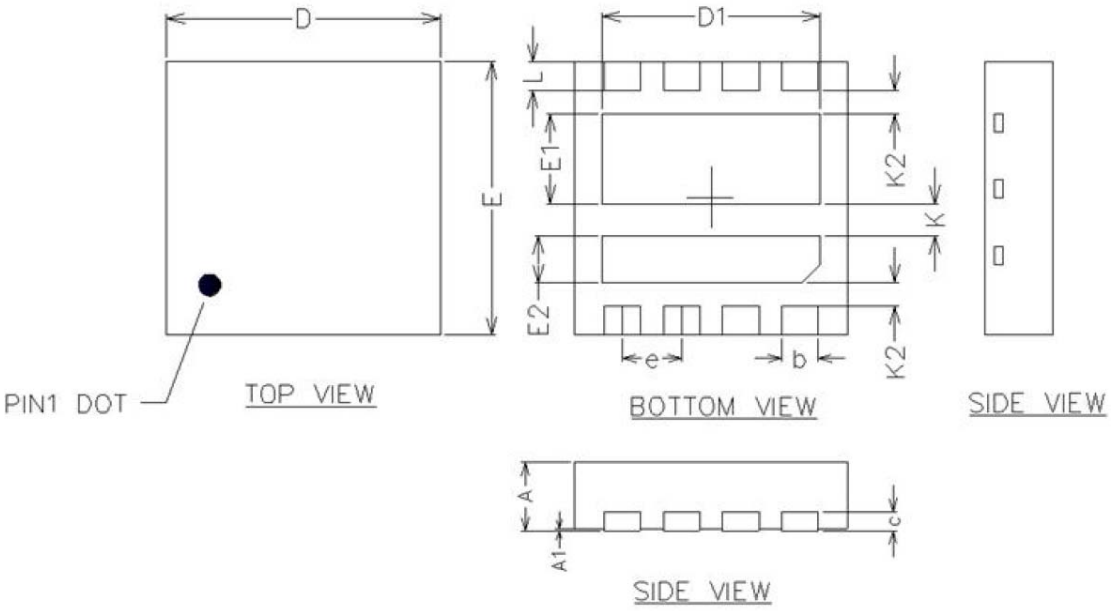


Gate Charge



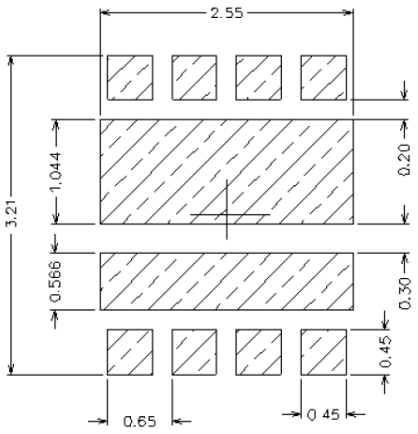
Package Information

DFN3*3E-8 Package



SYMBOLS	DFN3x3E-8_EP2_S			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.7	0.8	0.028	0.032
A1	0	0.05	0	0.002
c	0.203 REF.		0.008 REF.	
b	0.35	0.45	0.014	0.018
D	2.9	3.1	0.114	0.122
D1	2.3	2.5	0.09	0.098
E	2.9	3.1	0.114	0.122
E1	0.89	1.09	0.035	0.043
E2	0.42	0.62	0.016	0.024
e	0.65 BSC		0.026 BSC	
L	0.27	0.37	0.011	0.015
K	0.35 REF.		0.014 REF.	
K1	0.06 REF.		0.002 REF.	
K2	0.25 REF.		0.010 REF.	

RECOMMENDED LAND PATTERN



Design Notes

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