N-Channel Enhancement Mode MOSFET TDM2416

DESCRIPTION

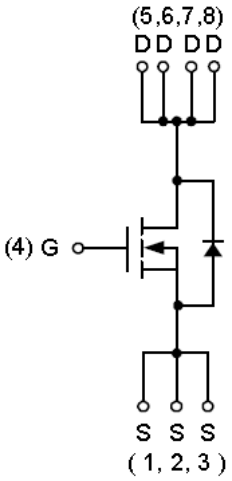
The TDM2416 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

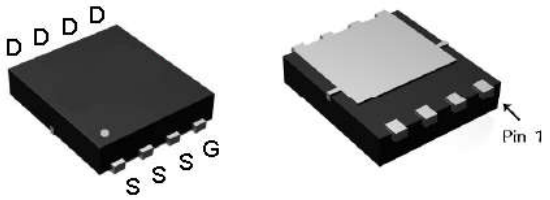
GENERAL FEATURES

- RDS(ON) < 5mΩ @ VGS=10V
  RDS(ON) < 7.3mΩ @ VGS=4.5V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

Application

- Power Management in Desktop Computer or DC/DC Converters.





DFN5x6-8

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Maximum Operating Junction Temperature	T_J	175	℃
Storage Temperature Range	T_{STG}	-55 To 150	℃
Diode Continuous Forward Current	I_S（T_C=25℃）	40	A
Drain Current @ Continuous	I_D（T_C=25℃）	88	A
	I_D（T_C=100℃）	62	A
Drain Current @ Current-Pulsed (Note 1)	I_{DM}（T_C=25℃）	353	A
Maximum Power Dissipation	P_D（T_C=25℃）	68	W
	P_D（T_C=100℃）	34	W
Thermal Resistance-Junction to Case	$R_{\theta JC}$(Steady State)	2.2	°C/W
Drain Current @ Continuous	I_D (T_A=25℃)	16.4	A
	I_D (T_A=70℃)	13.7	A
Drain Current @ Current-Pulsed (Note 1)	I_{DM}（T_A=25℃）	65	A

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

Maximum Power Dissipation (Note 2)	P_D (T_A=25℃)	2.3	W
	P_D (T_A=70℃)	1.6	W
Thermal Resistance-Junction to Ambient (Note 2)	$R_{\theta JA}$ ($t \leq 10s$)	25	°C/W
	$R_{\theta JA}$ (Steady State)	64	°C/W
Avalanche Current, Single pulse (Note3)	I_{AS}(L=0.1mH)	27	A
Avalanche Energy, Single pulse (Note3)	E_{AS}(L=0.1mH)	36	mJ

Note 1: Pulse width is limited by max. junction temperature.

Note 2: Surface mounted on 1in^2 pad area, steady state t = 999s.

Note 3: UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature T_j=25°C).

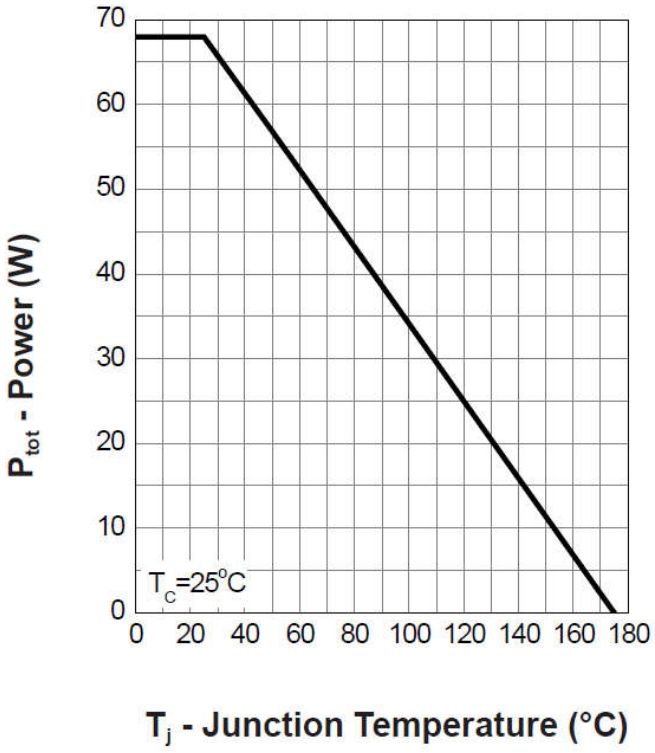
ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=32V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1.4	1.8	2.5	V
Drain-Source On-State Resistance (Note4)	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	4.2	5	mΩ
		V_{GS}=4.5V, I_D=15A	-	5.6	7.3	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	1370	1781	PF
Output Capacitance	C_{oss}		-	317	-	PF
Reverse Transfer Capacitance	C_{rss}		-	46	-	PF
SWITCHING CHARACTERISTICS						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=20V, R_L=20Ω, V_{GEN}=10V,R_G=6Ω	-	13.3	24	nS
Turn-on Rise Time	t_r	I_D=1A	-	7.9	15	nS
Turn-Off Delay Time	$t_{d(off)}$		-	29.1	53	nS
Turn-Off Fall Time	t_f		-	21	38	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=20A,V_{GS}=10V	-	22	30.8	nC
Gate-Source Charge	Q_{gs}		-	4.2	-	nC
Gate-Drain Charge	Q_{gd}		-	3	-	nC
Body Diode Reverse Recovery Time	T_{rr}	I_F=20A, dI/dt=100A/μs	-	23	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	15	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 4)	V_{SD}	V_{GS}=0V,I_S=20A	-	0.85	1.1	V

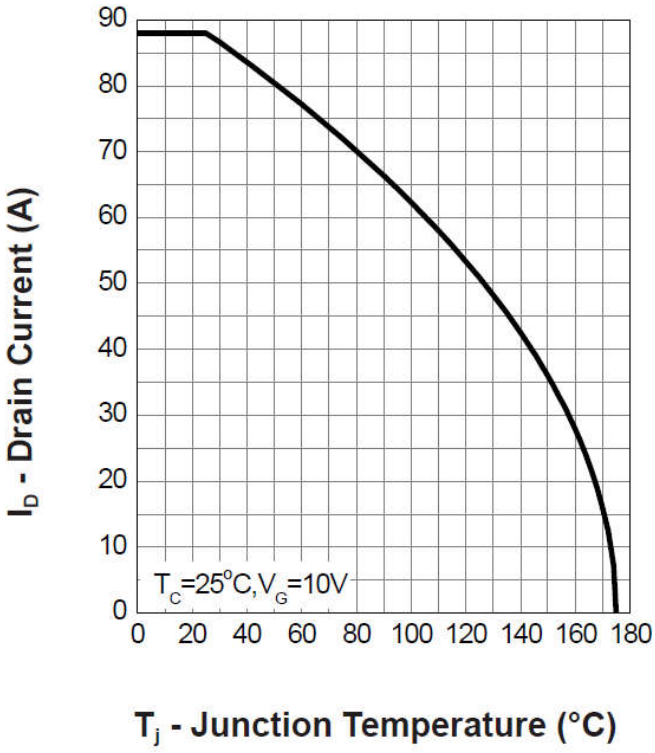
NOTES:4 Pulse test ; pulse width≤300ms, duty cycle≤2%

Typical Operating Characteristics

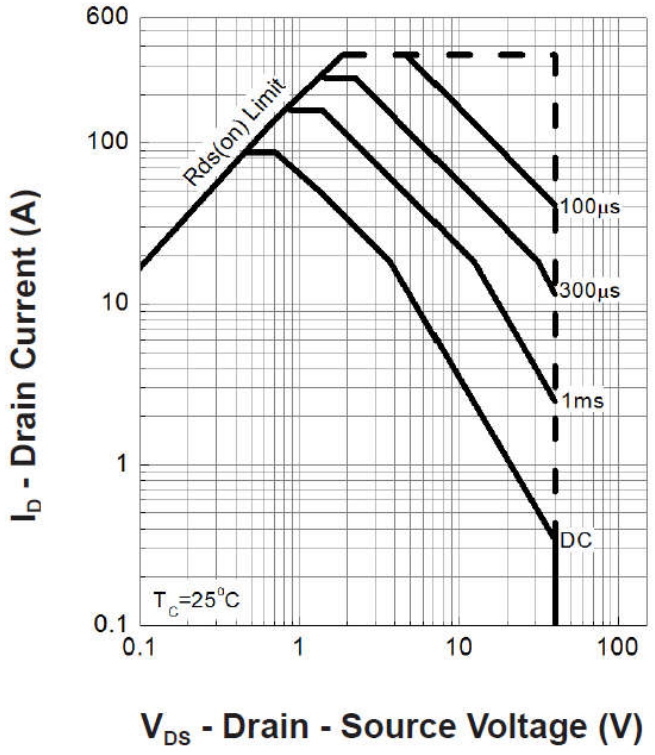
Power Dissipation



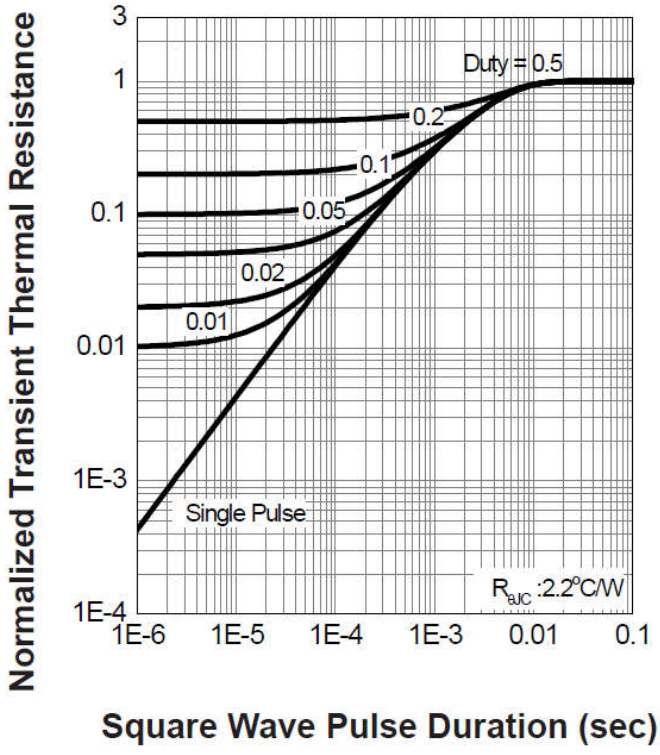
Drain Current



Safe Operation Area

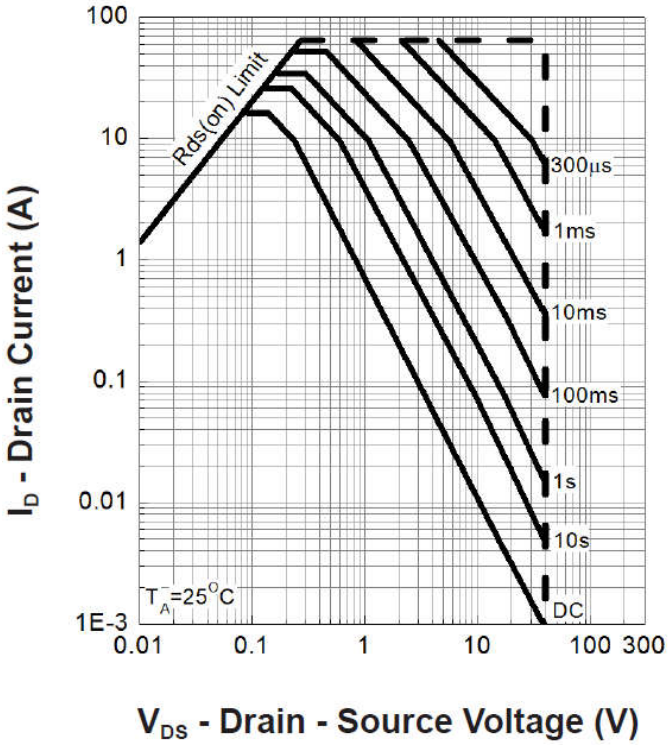


Thermal Transient Impedance

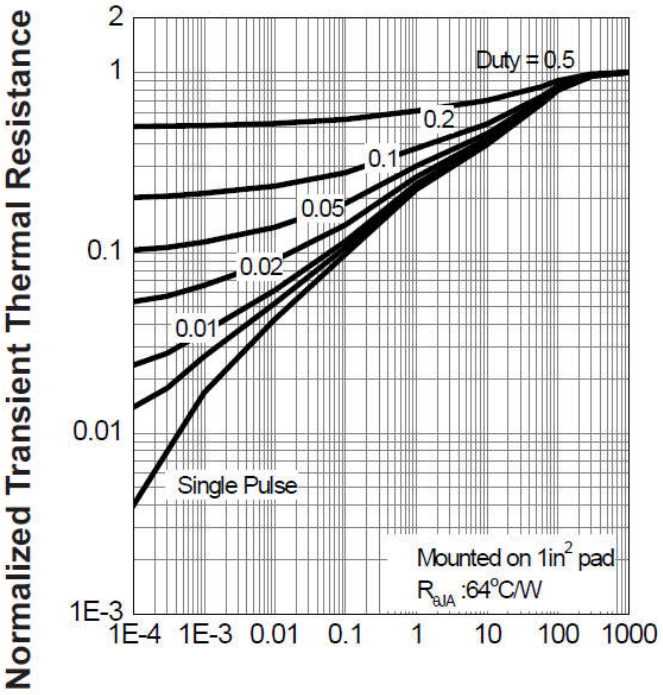


Typical Operating Characteristics(Cont.)

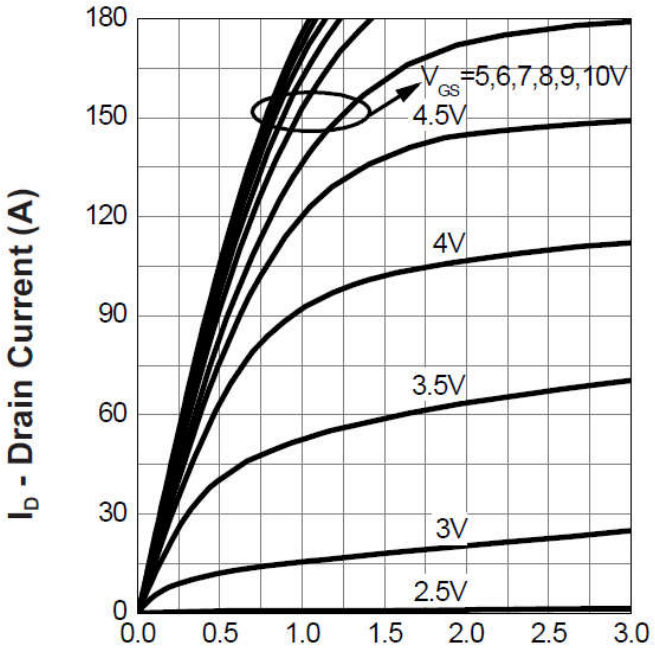
Safe Operation Area



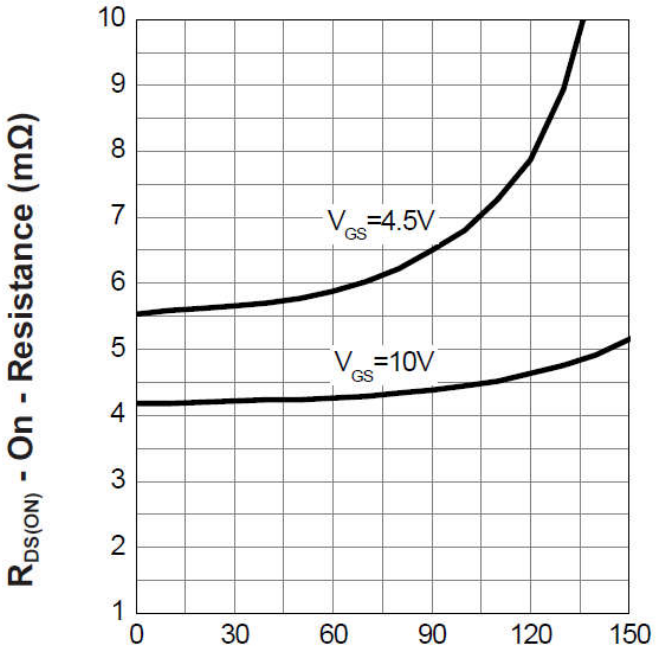
Thermal Transient Impedance



Output Characteristics

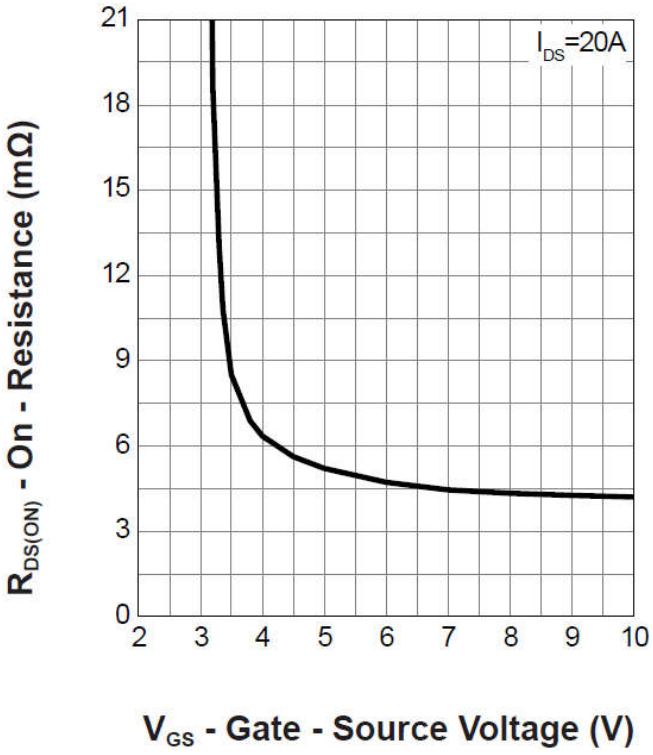


Drain-Source On Resistance

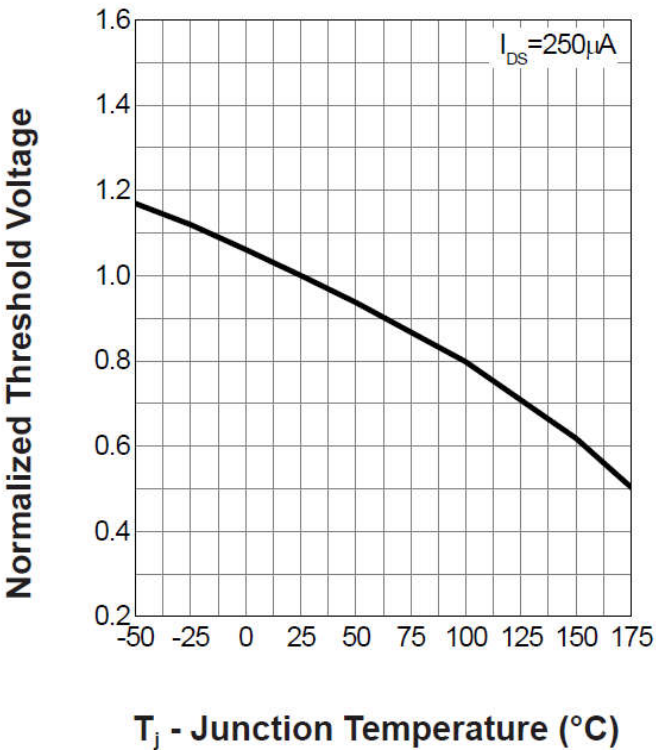


Typical Operating Characteristics (Cont.)

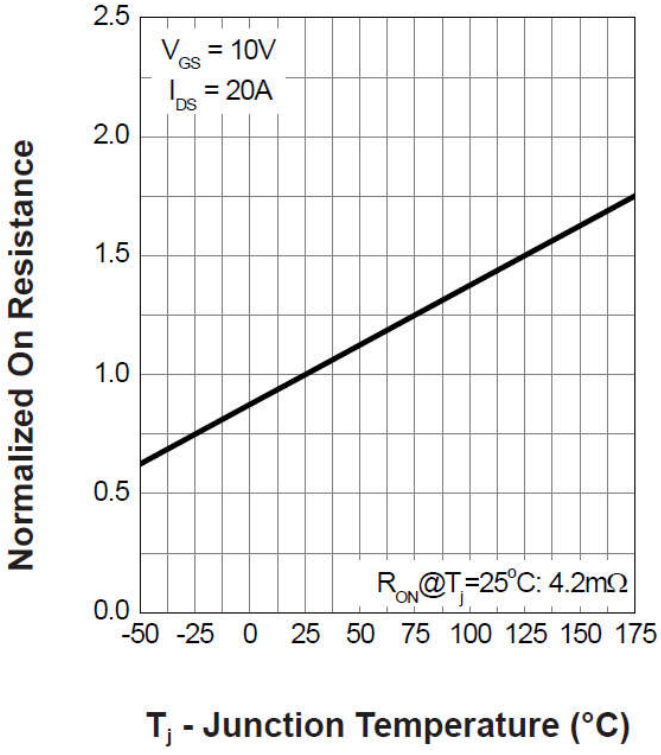
Gate-Source On Resistance



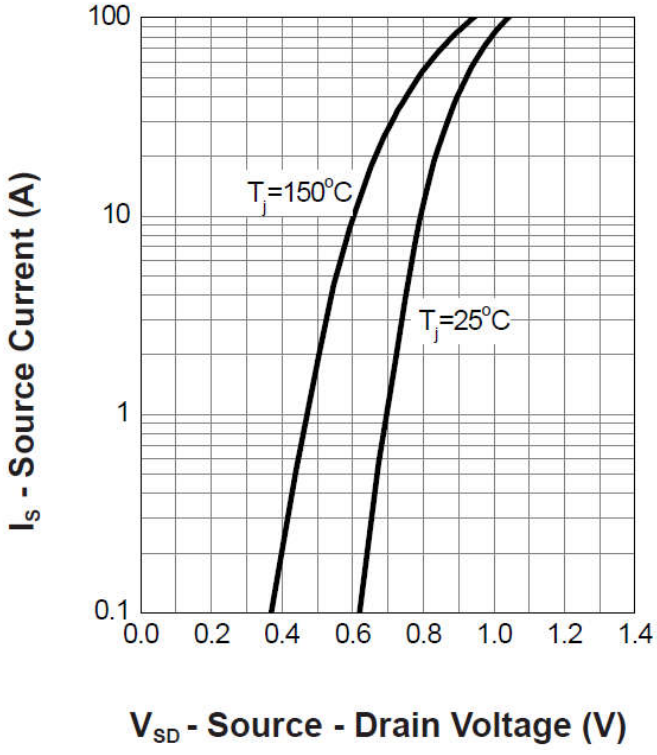
Gate Threshold Voltage



Drain-Source On Resistance

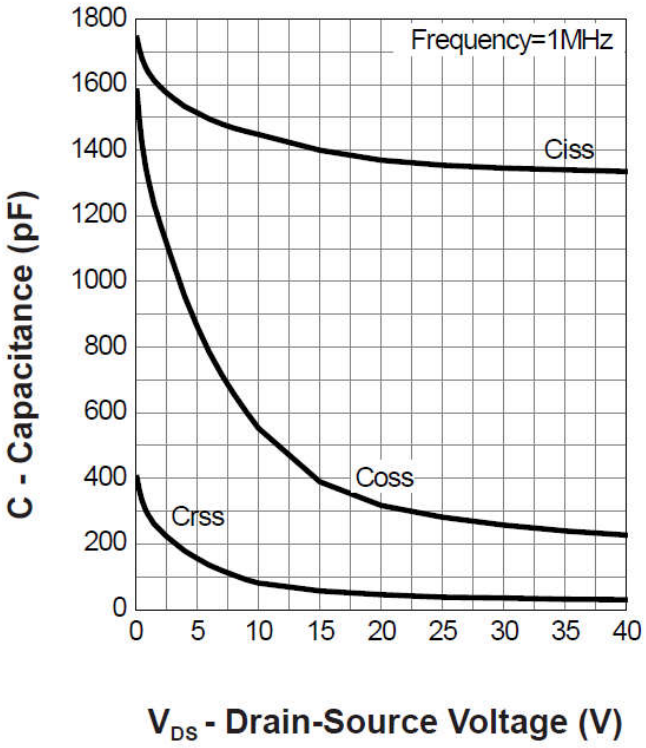


Source-Drain Diode Forward

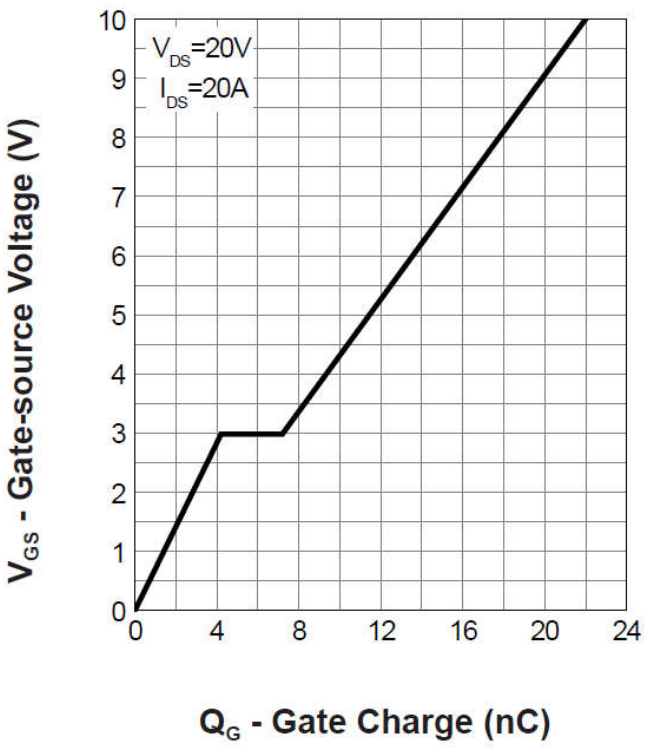


Typical Operating Characteristics (Cont.)

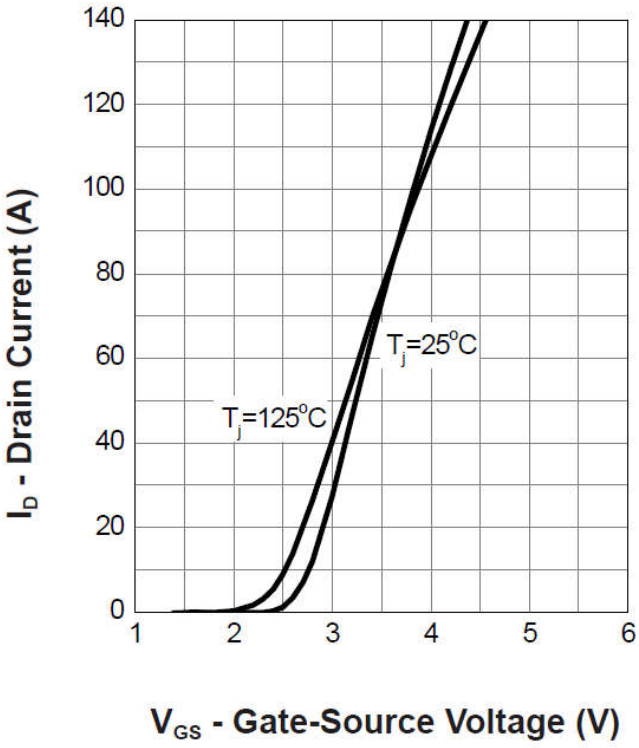
Capacitance



Gate Charge

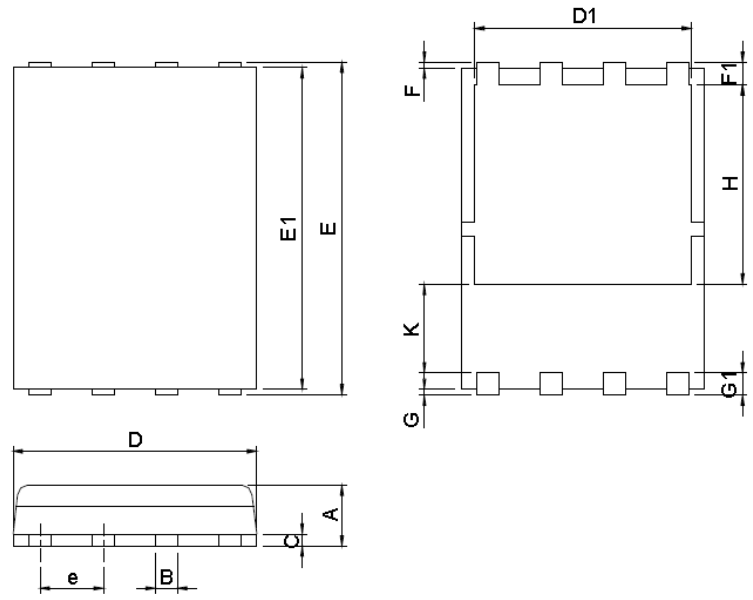


Transfer Characteristics



Package Information

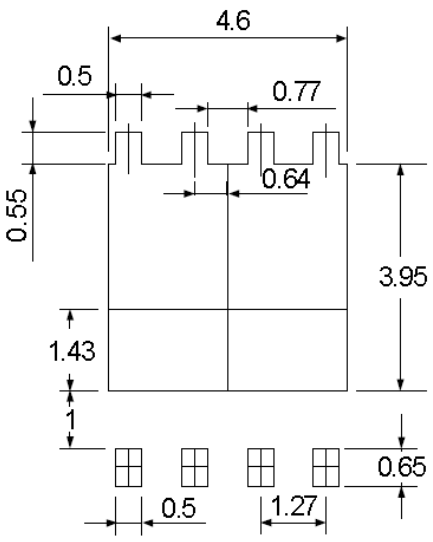
DFN5*6-8 Package



SYMBOL	DFN5x6-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.20	0.035	0.047
B	0.3	0.51	0.012	0.020
C	0.19	0.25	0.007	0.010
D	4.80	5.30	0.189	0.209
D1	4.00	4.40	0.157	0.173
E	5.90	6.20	0.232	0.244
E1	5.50	5.80	0.217	0.228
e	1.27 BSC		0.050 BSC	
F	0.05	0.30	0.002	0.012
F1	0.35	0.75	0.014	0.030
G	0.05	0.30	0.002	0.012
G1	0.35	0.75	0.014	0.030
H	3.34	3.9	0.131	0.154
K	0.762	-	0.03	-

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.
Mold flash or protrusions shall not exceed 10 mil.

RECOMMENDED LAND PATTERN



UNIT: mm

Design Notes