N-Channel Enhancement Mode MOSFET TDM3580

DESCRIPTION

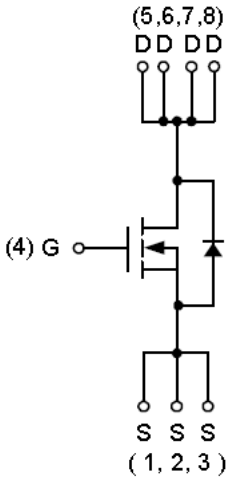
The TDM3580 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

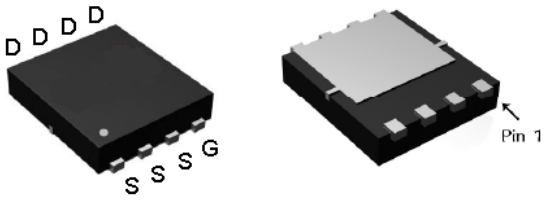
GENERAL FEATURES

- RDS(ON) < 1.4mΩ @ VGS=10V
  RDS(ON) < 2.1mΩ @ VGS=4.5V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management





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
Diode Continuous Forward Current	I_S（T_C=25℃）	47	A
Drain Current @ Continuous(Note 1)	I_D（T_C=25℃）	100	A
	I_D（T_C=100℃）	100	A
Drain Current @ Current-Pulsed (Note 2)	I_{DM}（T_C=25℃）	400	A
Maximum Power Dissipation	P_D（T_C=25℃）	104	W
	P_D（T_C=100℃）	52.1	W
Drain Current @ Continuous	I_D（T_A=25℃）	25.3	A
	I_D（T_A=70℃）	21.2	A
Drain Current @ Current-Pulsed (Note 2)	I_{DM}（T_A=25℃）	101	A
Maximum Power Dissipation	P_D(T_A=25℃)	2.5	W
	P_D(T_A=70℃)	1.75	W
Avalanche Current, Single pulse(Note 4)	I_{AS} (L=0.1mH)	65	A
Avalanche Energy, Single pulse(Note 4)	E_{AS}(L=0.1mH)	211	mJ

THERMAL CHARACTERISTICS

Maximum Operating Junction Temperature	T_J	175	℃
Storage Temperature Range	T_{STG}	-55 To 175	℃
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.44	℃/W
Thermal Resistance,Junction-to-Ambient (Note 3)	$R_{\theta JA}$	50	℃/W

ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static 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
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1.3	1.7	2.5	V
Drain-Source On-State Resistance(Note5)	$R_{DS(ON)}$	V_{GS}=10V, I_D=25A	-	1.17	1.4	mΩ
		V_{GS}=4.5V, I_D=15A	-	1.6	2.1	mΩ
Forward Transconductance	Gfs	V_{DS}=5V,I_{DS}=15A	-	60	-	S
Diode Characteristics						
Diode Forward Voltage (Note 5)	V_{SD}	V_{GS}=0V,I_{SD}=25A	-	0.75	1.1	V
Reverse Recovery Time	t_{rr}	I_{SD}=25A,dI_{SD}/dt=100A/μs	-	51	-	ns
Charge Time	t_a		-	27	-	
Discharge Time	t_b		-	25	-	
Reverse Recovery Charge	Q_{rr}		-	51	-	nC
Dynamic Characteristics (Note6)						
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1	2	Ω
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	4945	6429	PF
Output Capacitance	C_{oss}		-	1280	-	PF
Reverse Transfer Capacitance	C_{rss}		-	165	-	PF
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V, R_L=20Ω, V_{GEN}=10V,R_G=6Ω I_{DS}=1A	-	21.5	39	nS
Turn-on Rise Time	t_r		-	13	24	nS
Turn-Off Delay Time	$t_{d(off)}$		-	93	168	nS
Turn-Off Fall Time	t_f		-	87	157	nS
Gate Charge Characteristics(Note6)						
Total Gate Charge	Q_g	V_{DS}=20V,I_D=25A,V_{GS}=10V	-	78	109	nC
Total Gate Charge	Q_g	V_{DS}=20V,I_D=25A,V_{GS}=4.5V	-	36	-	nC
Threshold Gate Charge	Q_{gth}		-	8	-	nC
Gate-Source Charge	Q_{gs}		-	14	-	nC
Gate-Drain Charge	Q_{gd}		-	9.6	-	nC

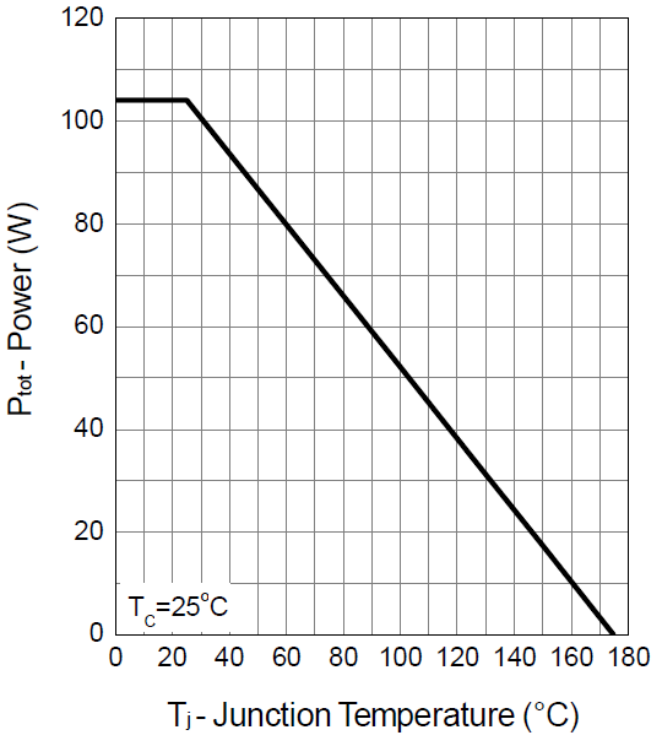
NOTES:

1. Max. continuous current is limited by bonding wire.

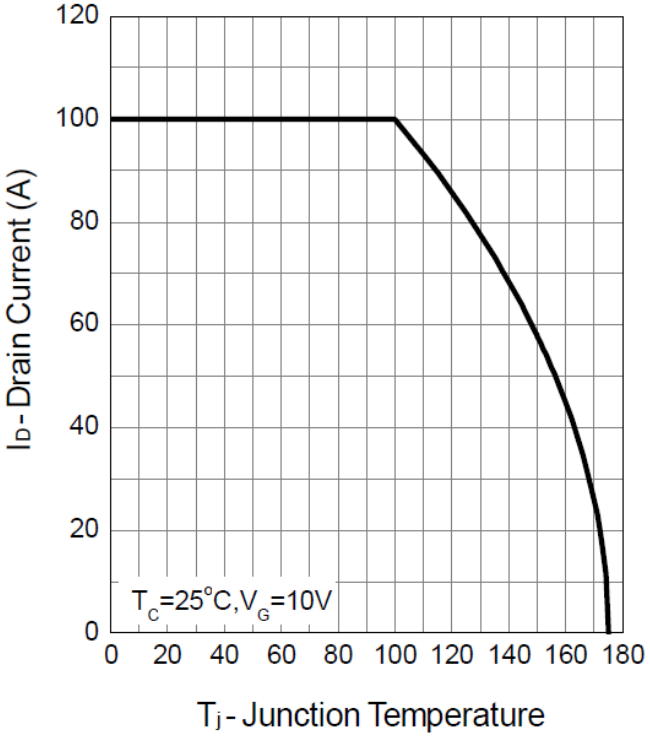
2. Pulse width limited by max. junction temperature.
3. Surface mounted on 1in2 pad area, steady state t = 999s.
4. UIS tested and pulse width limited by maximum junction temperature 150℃ (initial temperature Tj=25℃)..
5. Pulse test ; pulse width≤300ms, duty cycle≤2%.
6. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

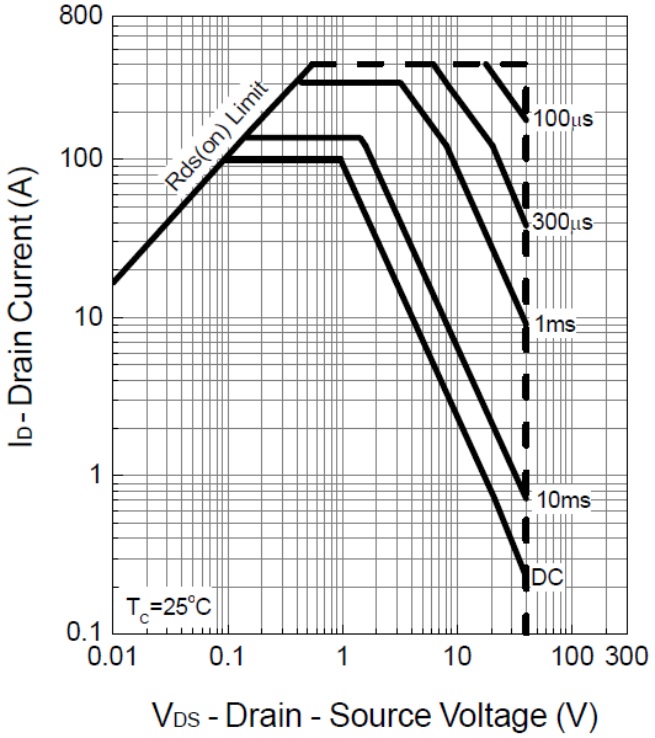
Power Dissipation



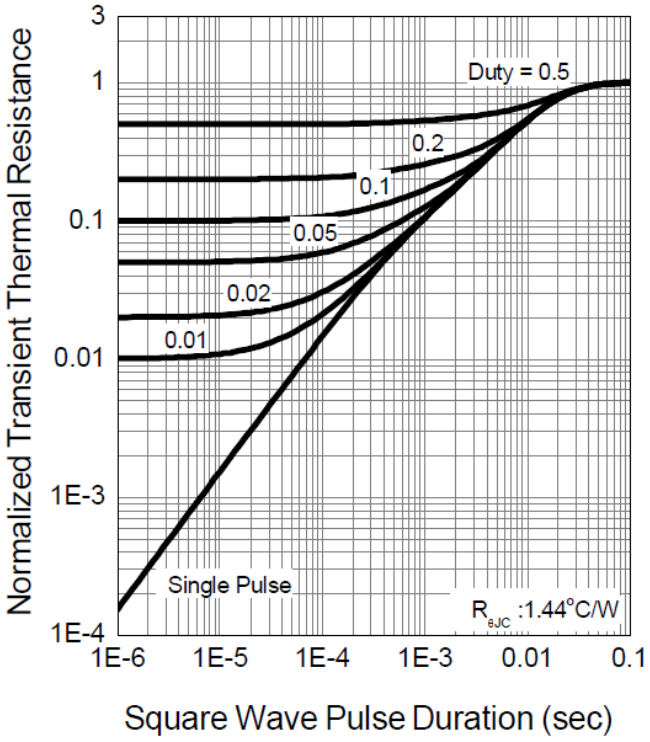
Drain Current



Safe Operation Area

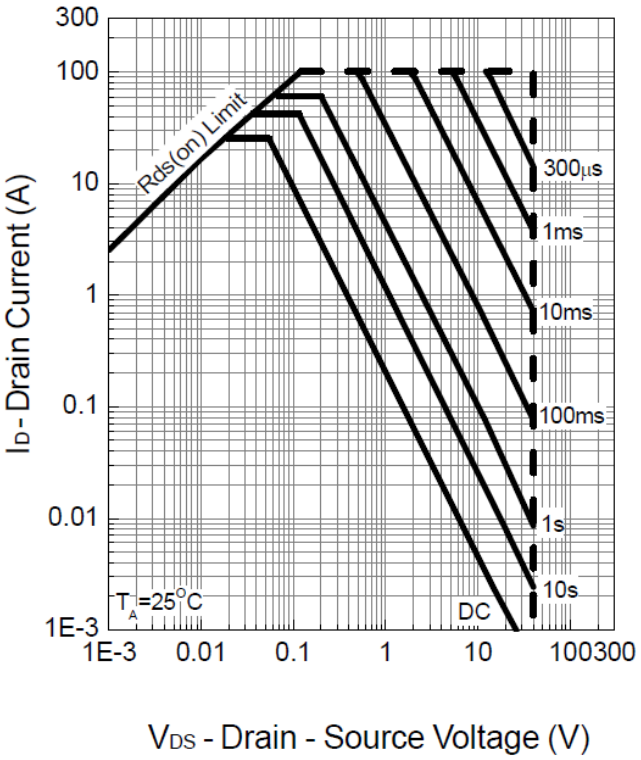


Thermal Transient Impedance

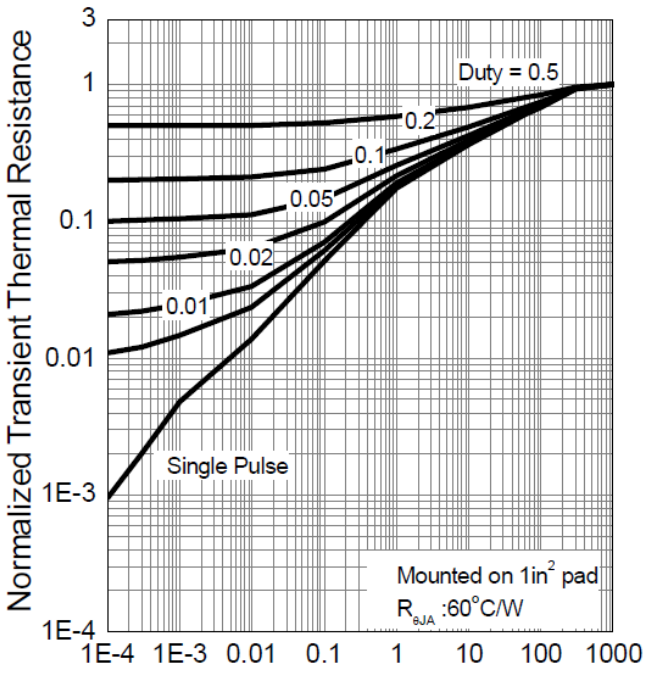


Typical Operating Characteristics(Cont.)

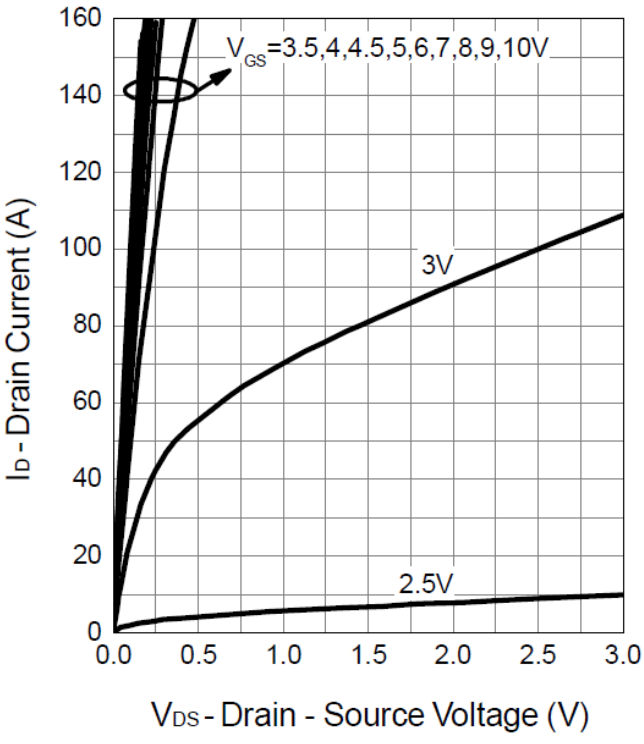
Safe Operation Area



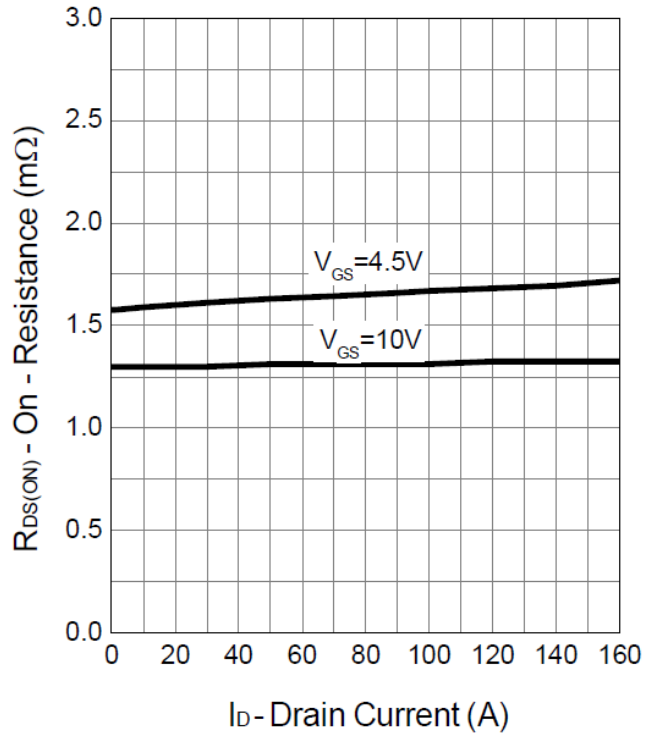
Thermal Transient Impedance



Output Characteristics

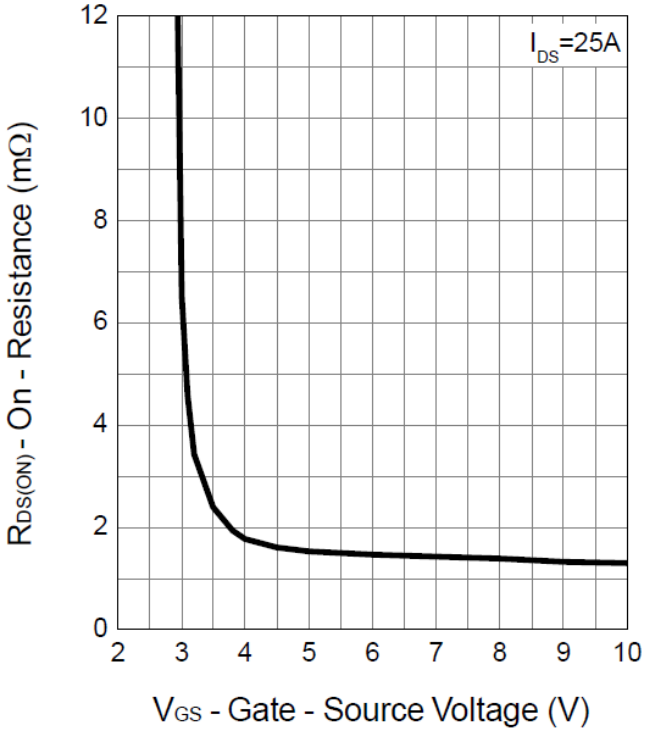


Drain-Source On Resistance

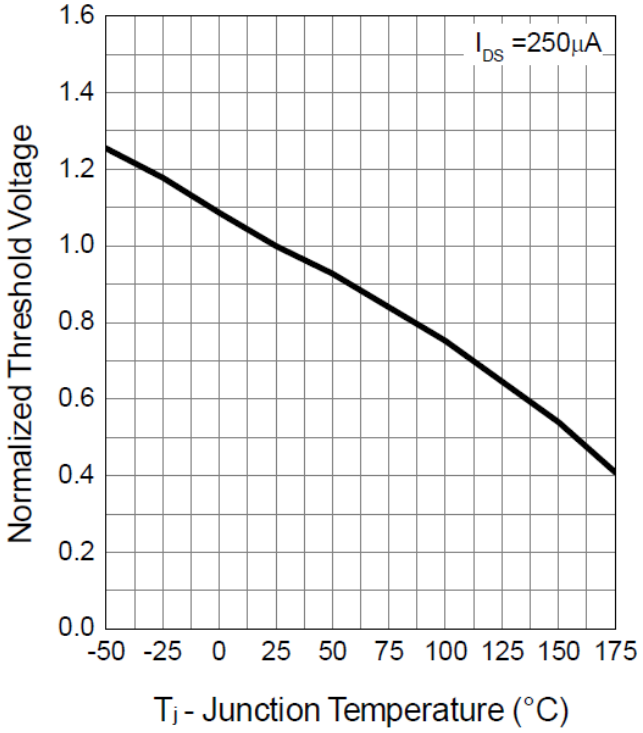


Typical Operating Characteristics (Cont.)

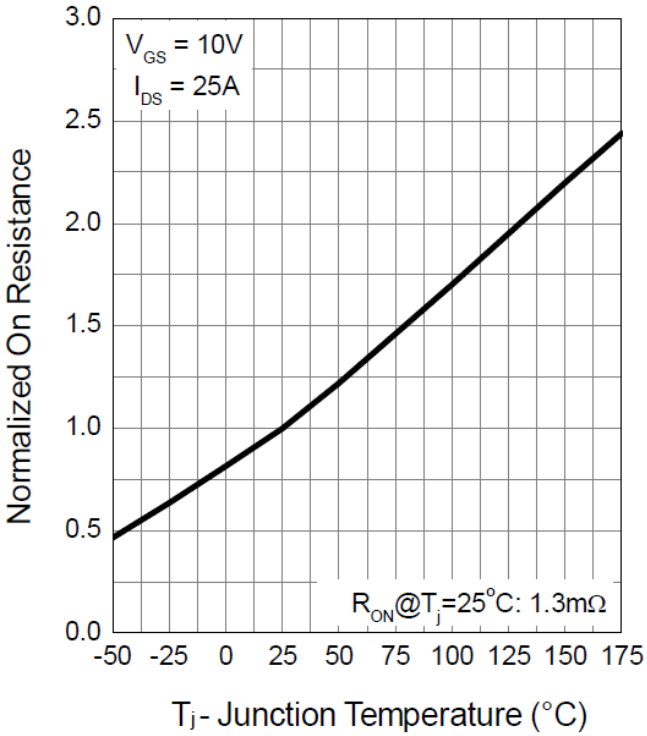
Gate-Source On Resistance



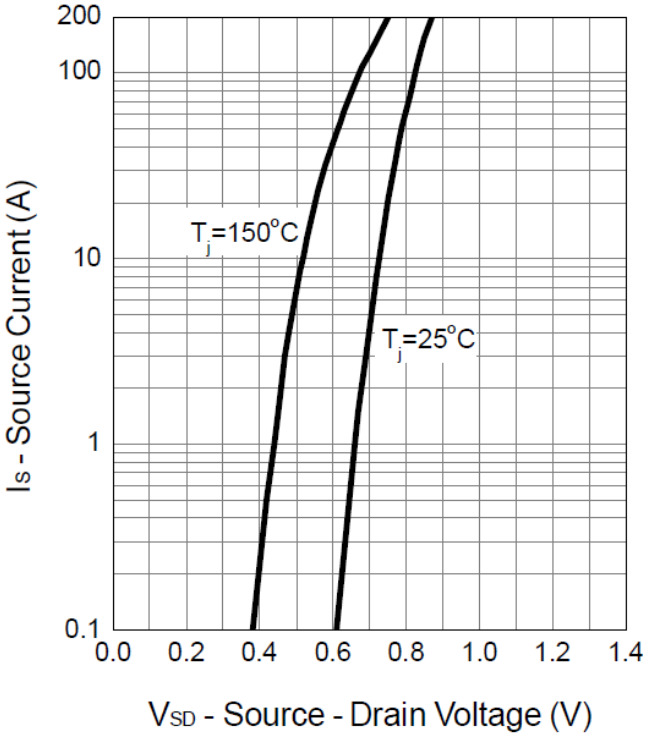
Gate Threshold Voltage



Drain-Source On Resistance

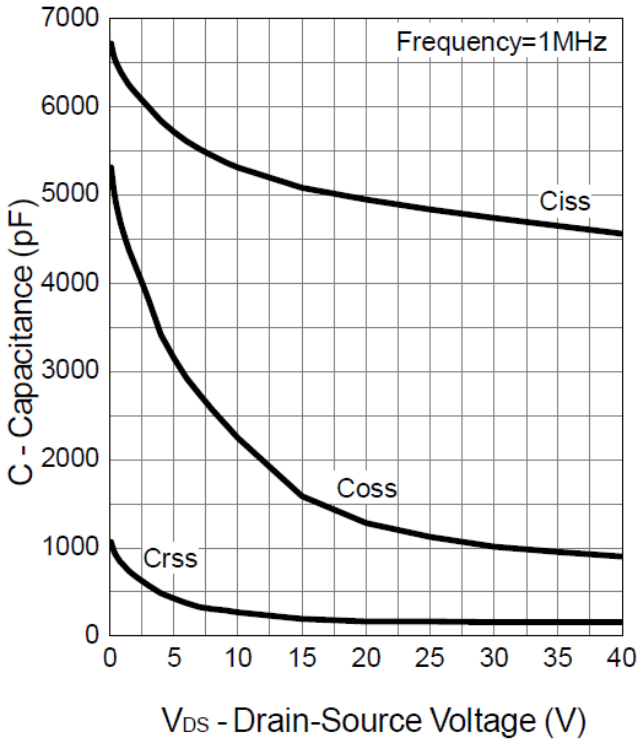


Source-Drain Diode Forward

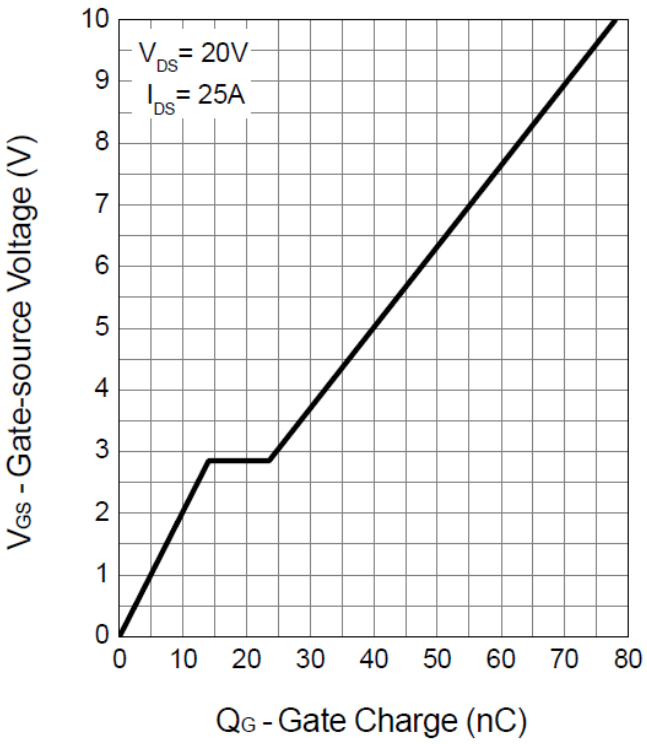


Typical Operating Characteristics (Cont.)

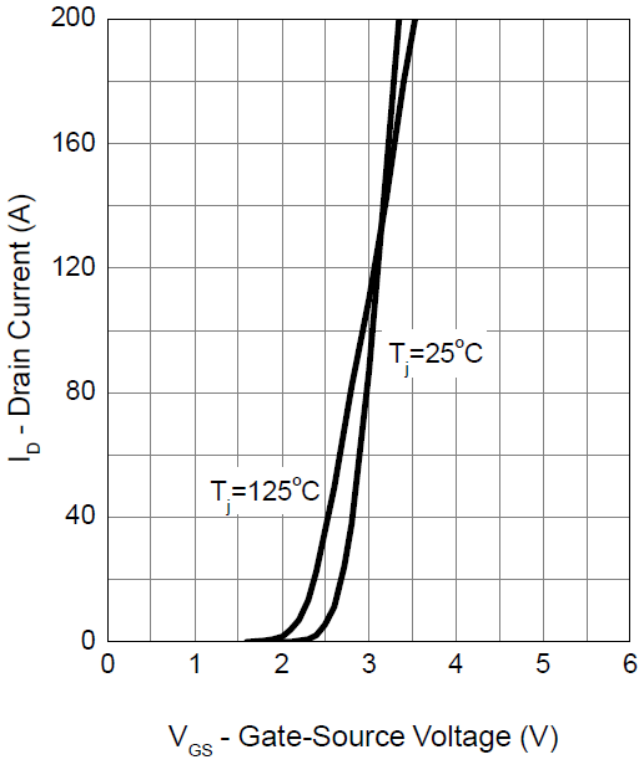
Capacitance



Gate Charge

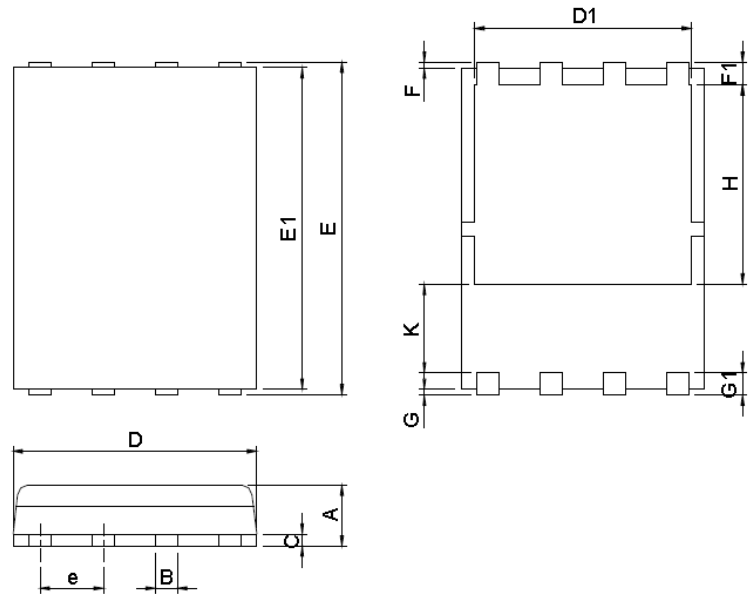


Transfer Characteristics



Package Information

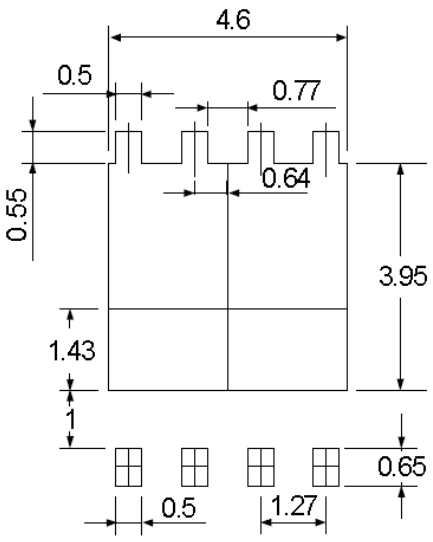
DFN5*6-8 Package



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