

N-Channel Enhancement Mode MOSFET

TDM3576

DESCRIPTION

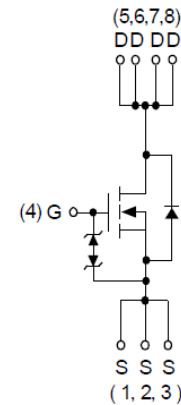
The TDM3576 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

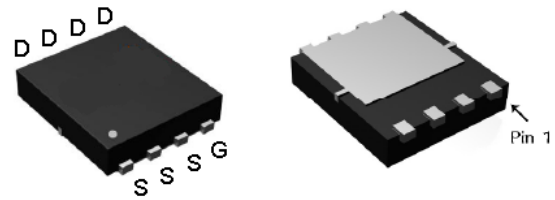
- $R_{DS(ON)} < 6.7m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)} < 10.3m\Omega$ @ $V_{GS}=4.5V$
- High Power and current handling capability
- ESD protection
- Lead free product is available
- Surface Mount Package

Application

- Power Management in Desktop Computer or DC/DC Converters



N-Channel MOSFET



DFN5x6-8

ABSOLUTE MAXIMUM RATINGS($T_A=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	20	A
Drain Current @ Continuous	I_D ($T_C=25^\circ\text{C}$)	61	A
	I_D ($T_C=100^\circ\text{C}$)	43	A
Drain Current @ Current-Pulsed	I_{DM} ($T_C=25^\circ\text{C}$)	244	A
Maximum Power Dissipation	P_D ($T_C=25^\circ\text{C}$)	50	W
	P_D ($T_C=100^\circ\text{C}$)	23.5	W
Drain Current @ Continuous(Note 1)	I_D ($T_A=25^\circ\text{C}$)	14.2	A
	I_D ($T_A=70^\circ\text{C}$)	12	A
Drain Current @ Current-Pulsed (Note 2)	I_{DM} ($T_A=25^\circ\text{C}$)	57	A
Maximum Power Dissipation(Note 1)	P_D ($T_A=25^\circ\text{C}$)	2.5	W
	P_D ($T_A=70^\circ\text{C}$)	1.8	W
Avalanche Current, Single pulse(Note 3)	$I_{AS}(L=0.1mH)$	23	A
Avalanche Energy, Single pulse(Note 3)	$E_{AS}(L=0.1mH)$	26.5	mJ
Maximum Operating Junction Temperature	T_J	175	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 To 175	$^\circ\text{C}$

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THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient (Note 1)	R _{θJA} (t ≤ 10s)	25	°C/W
	R _{θJA} (Steady State)	60	°C/W
Thermal Resistance-Junction to Case	R _{θJC} (Steady State)	3.2	°C/W

ELECTRICAL CHARACTERISTICS (T_A=25°C 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	μ A
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V,V _{DS} =0V	-	-	±10	μ A
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} ,I _D =250μA	1.4	1.8	2.5	V
Drain-Source On-State Resistance(Note 4)	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	5.6	6.7	mΩ
		T _J =125℃	-	9.2	-	mΩ
		V _{GS} =4.5V, I _D =15A	-	7.9	10.3	mΩ
Forward Transconductance	G _{fs}	V _{DS} =5V, I _{DS} =15A	-	21	-	S
Dynamic Characteristics(Note 5)						
Gate Resistance	R _G	V _{DS} =0V,V _{GS} =0V, F=1.0MHz	-	1.5	-	Ω
Input Capacitance	C _{iss}	V _{DS} =20V,V _{GS} =0V, F=1.0MHz	-	911	1185	PF
Output Capacitance	C _{oss}		-	222	-	PF
Reverse Transfer Capacitance	C _{rss}		-	30	-	PF
Turn-on Delay Time	t _{d(on)}	V _{DS} =20V, R _L =20Ω, V _{GEN} =10V,R _G =6Ω I _{DS} =1A	-	11.3	21	nS
Turn-on Rise Time	t _r		-	8.2	15	nS
Turn-Off Delay Time	t _{d(off)}		-	22.6	41	nS
Turn-Off Fall Time	t _f		-	15.4	28	nS
Gate Charge Characteristics(Note 5)						
Total Gate Charge	Q _g	V _{DS} =20V,I _D =20A,V _{GS} =10V	-	15	21	nC
Total Gate Charge	Q _g	V _{DS} =20V,I _D =20A,V _{GS} =4.5V	-	7.1	-	nC
Gate-Source Charge	Q _{gs}		-	3.2	-	nC
Gate-Drain Charge	Q _{gd}		-	1.9	-	nC
Diode Characteristics						
Diode Forward Voltage (Note 4)	V _{SD}	V _{GS} =0V,I _S =20A	-	0.85	1.1	V
Reverse Recovery Time	t _{rr}	I _{DS} =20A, dI _{SD} /dt=100A/μs	-	18.3	-	ns
Charge Time	t _a		-	8	-	
Discharge Time	t _b		-	10.2	-	
Reverse Recovery Charge	Q _{rr}		-	6.4	-	nC

NOTES:

1, Surface mounted on 1in² pad area, steady state t = 999s.

2, Pulse width limited by max. junction temperature.

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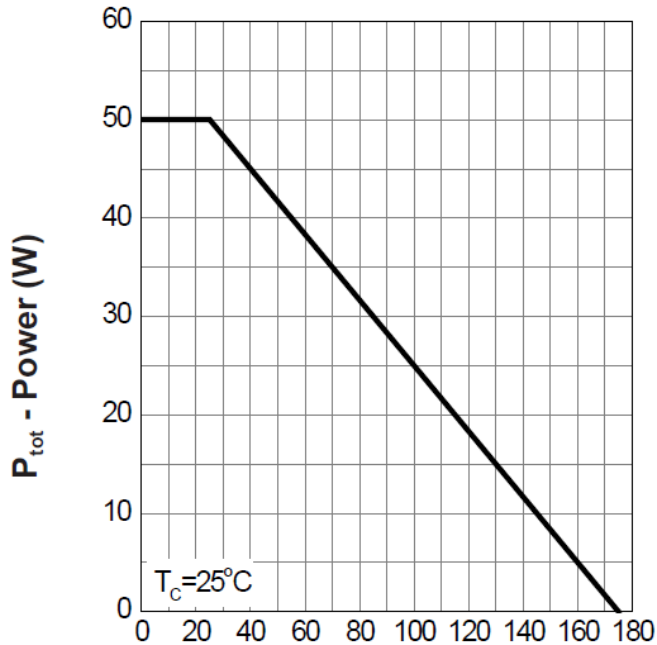
3, UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature $T_j=25^\circ\text{C}$).

4, Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

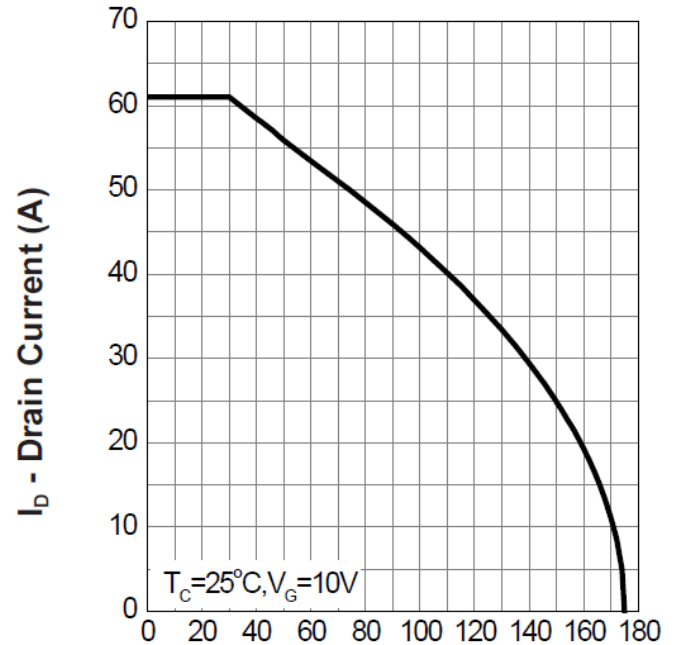
3, Guaranteed by design, not subject to production testing

Typical Operating Characteristics

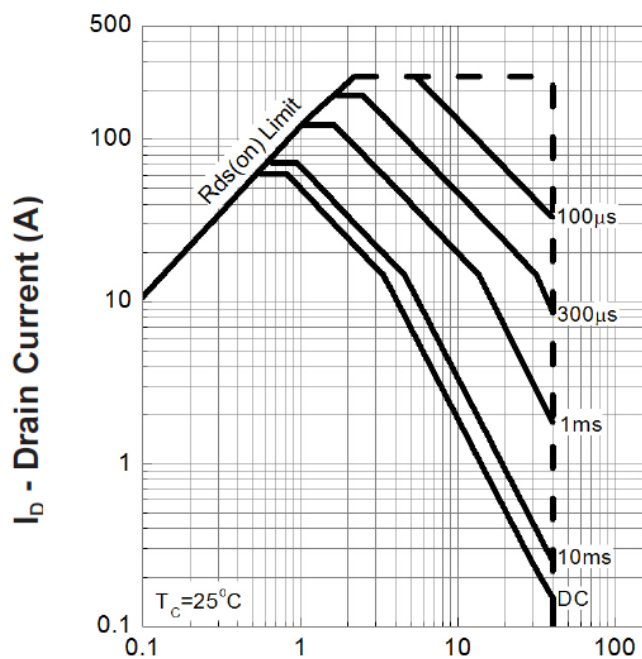
Power Dissipation

 T_j - Junction Temperature (°C)

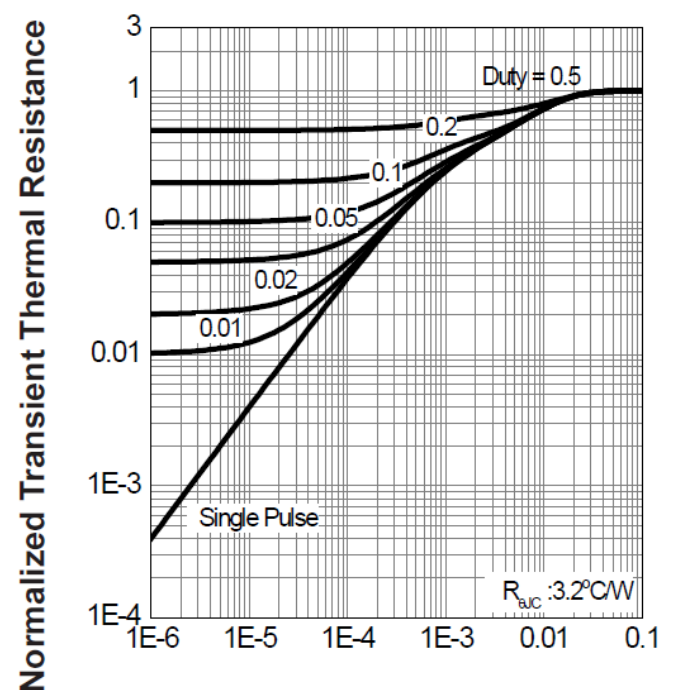
Drain Current

 T_j - Junction Temperature (°C)

Safe Operation Area

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

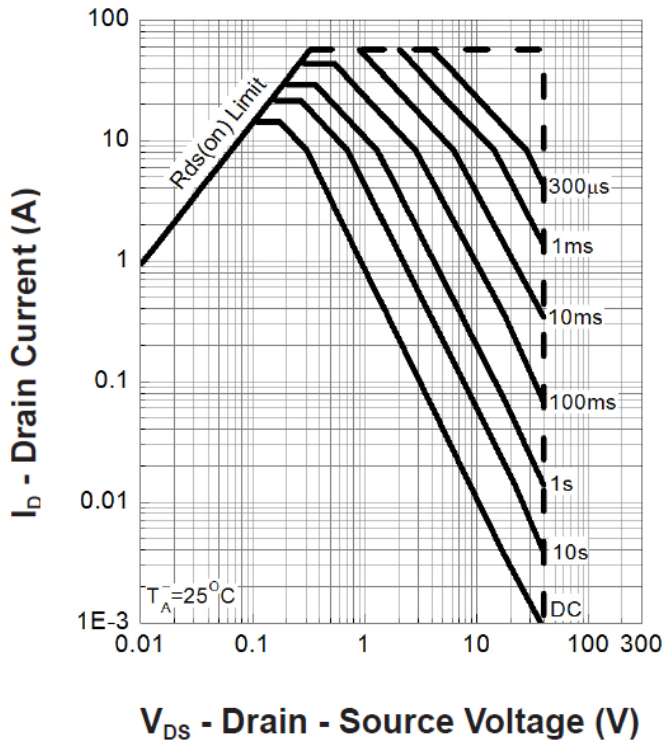
Thermal Transient Impedance



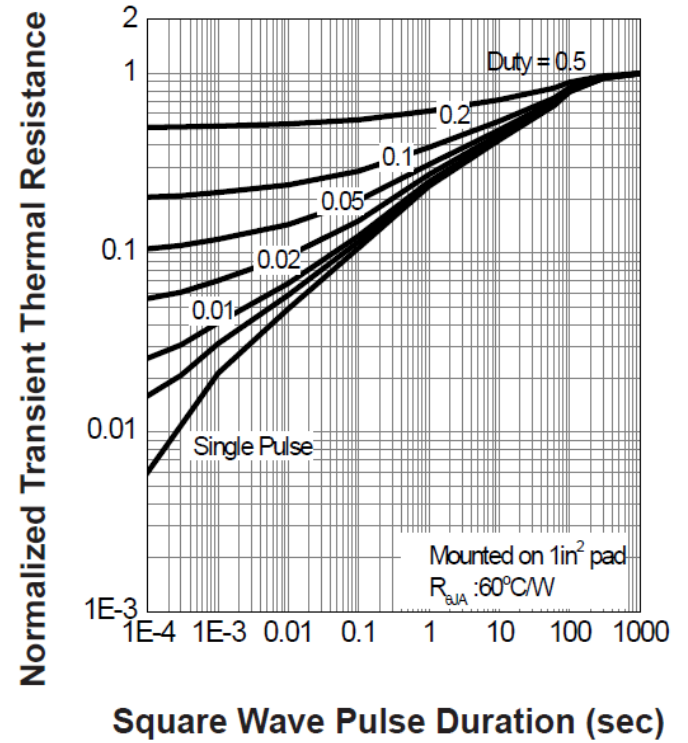
Square Wave Pulse Duration (sec)

Typical Operating Characteristics(Cont.)

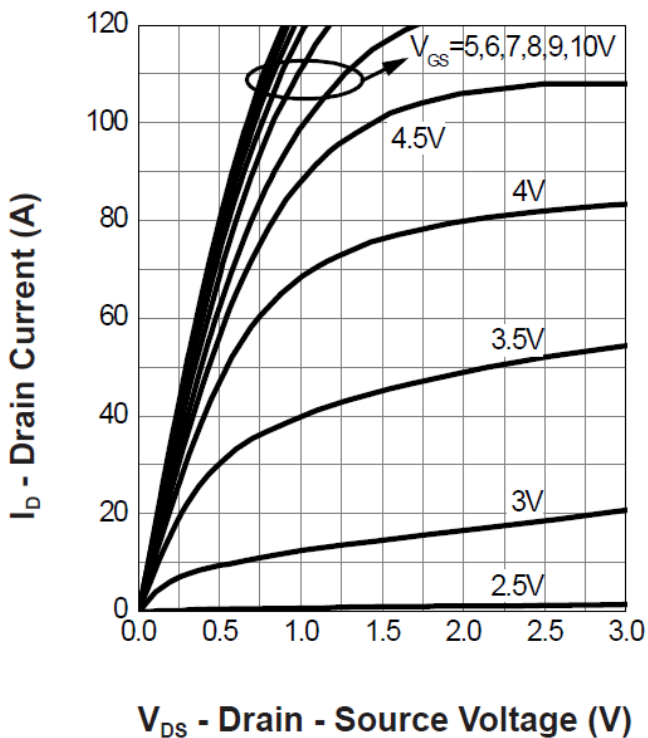
Safe Operation Area



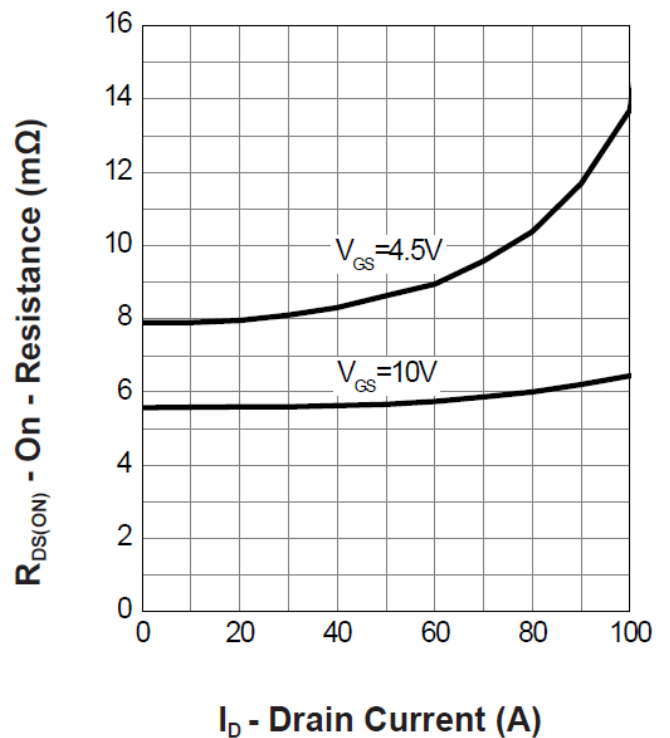
Thermal Transient Impedance



Output Characteristics

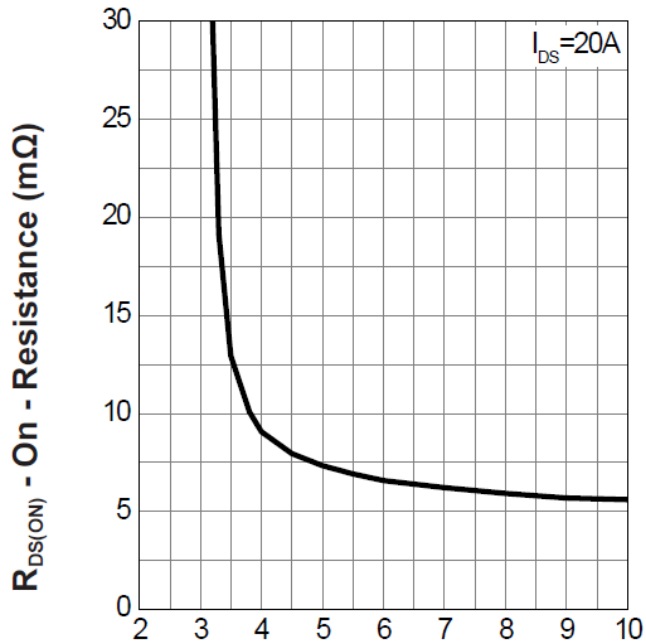


Drain-Source On Resistance

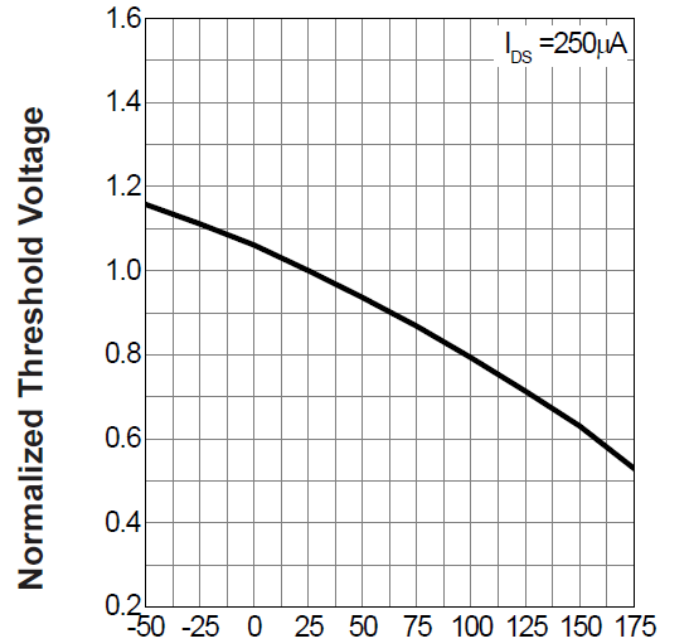


Typical Operating Characteristics(Cont.)

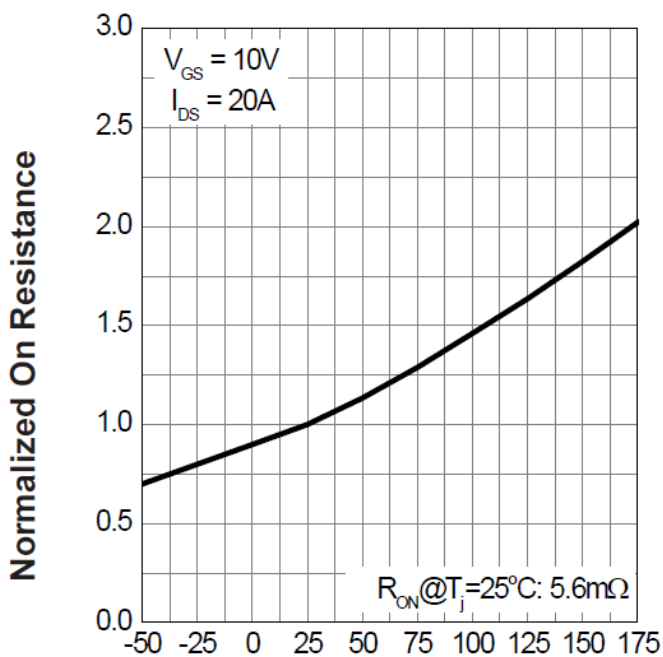
Gate-Source On Resistance

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

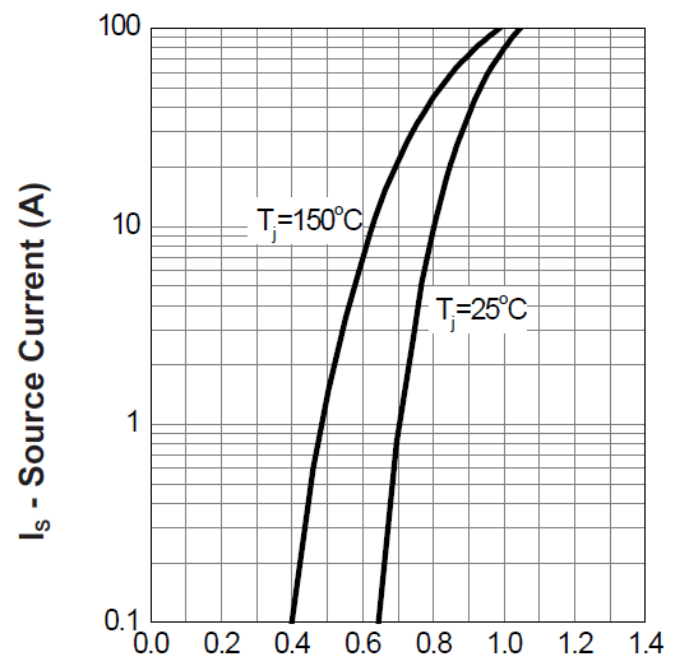
Gate Threshold Voltage

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

Drain-Source On Resistance

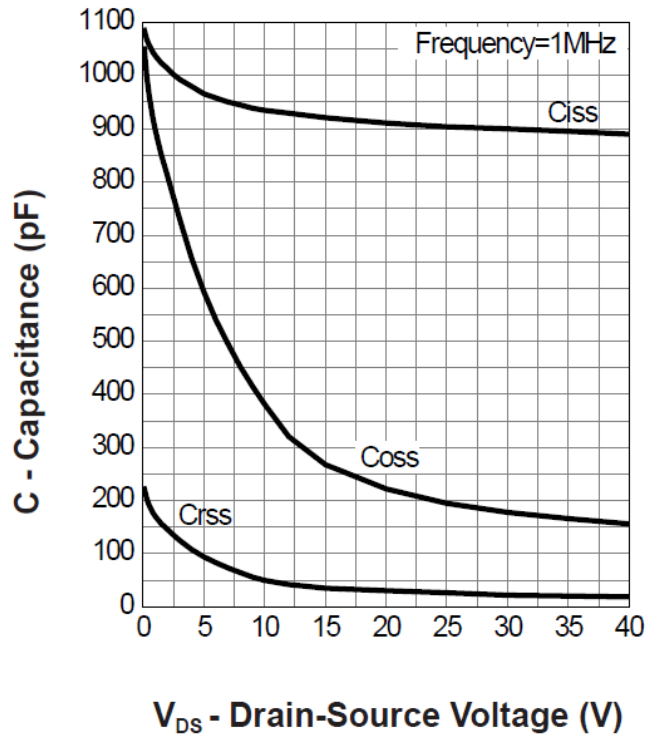
 T_J - Junction Temperature ($^{\circ}C$)

Source-Drain Diode Forward

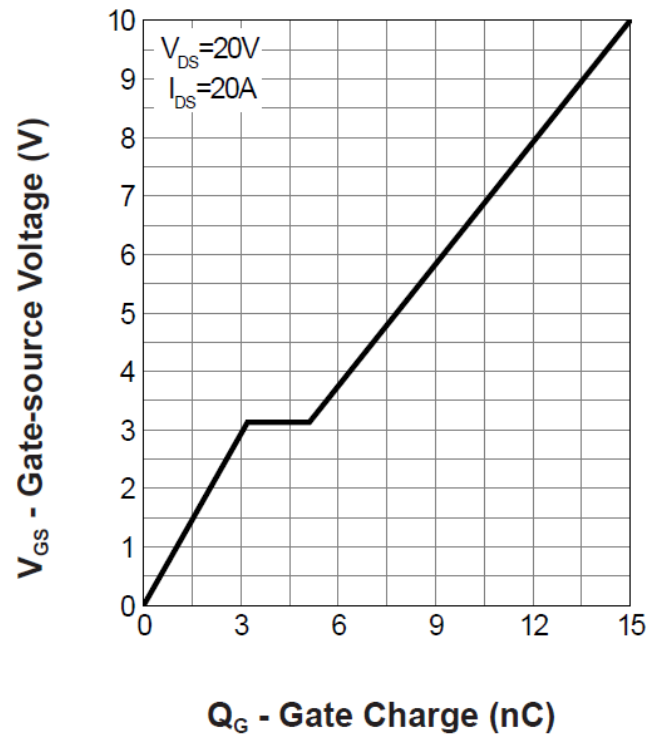
 V_{SD} - Source - Drain Voltage (V)

Typical Operating Characteristics(Cont.)

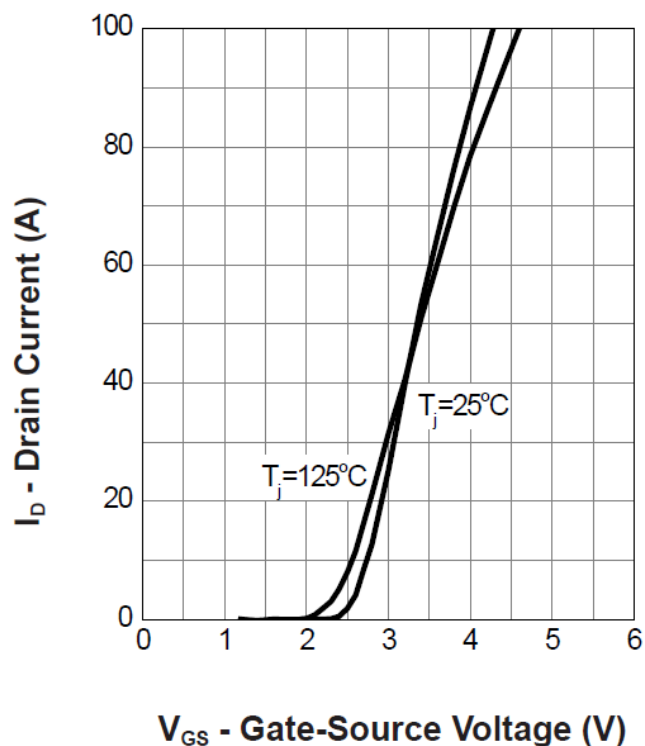
Capacitance



Gate Charge



Transfer Characteristics

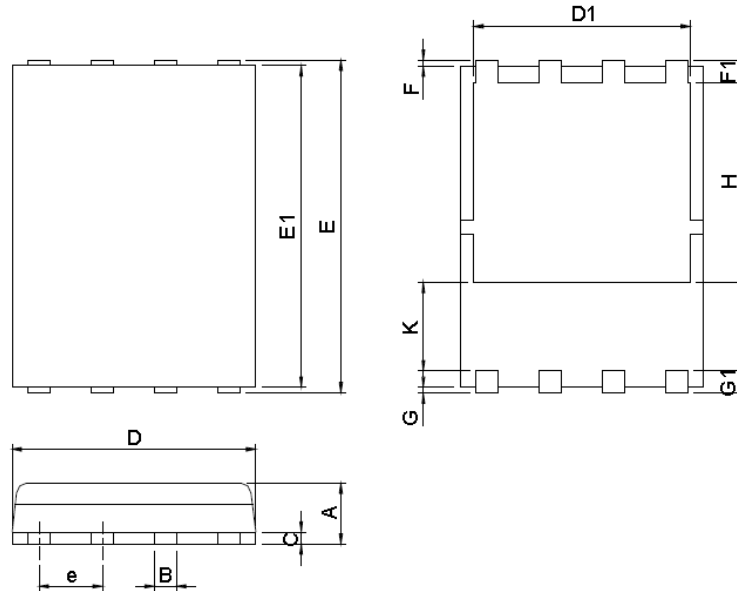


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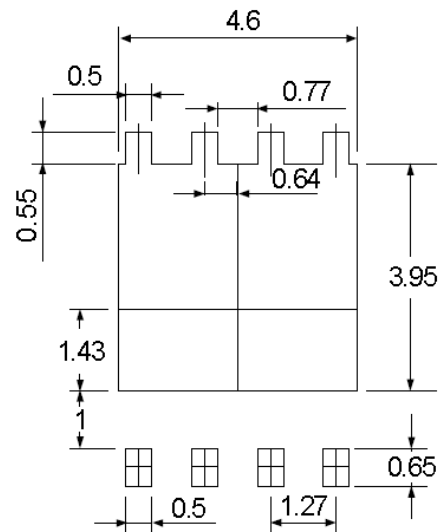
Package Information

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	-

RECOMMENDED LAND PATTERN



UNIT: mm

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

Design Notes