

N-Channel Enhancement Mode MOSFET

TDM3660

DESCRIPTION

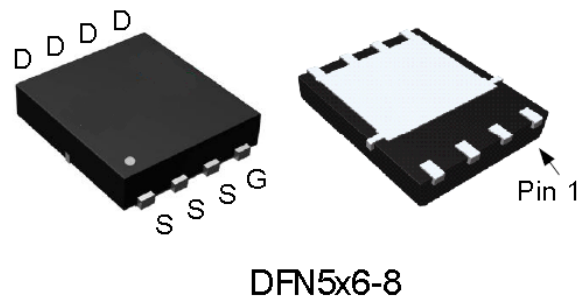
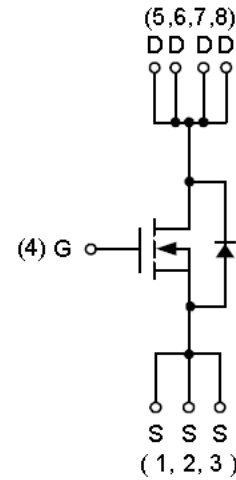
The TDM3660 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- RDS(ON) < 13mΩ @ VGS=4.5V
RDS(ON) < 10.5mΩ @ VGS=10V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management
- Motor Control



ABSOLUTE MAXIMUM RATINGS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	60	V
Gate-Source Voltage	V _{GS}	±20	V
Diode Continuous Forward Current	I _S (T _C =25°C)	25	A
Drain Current @ Continuous(Note 1)	I _D (T _C =25°C)	50	A
	I _D (T _C =100°C)	32	A
Drain Current @ Current-Pulsed (Note 2)	I _{DM} (T _C =25°C)	200	A
Maximum Power Dissipation	P _D (T _C =25°C)	52	W
	P _D (T _C =100°C)	20.8	W
Drain Current @ Continuous(Note 1)	I _D (T _A =25°C)	10	A
	I _D (T _A =70°C)	8	A
Maximum Power Dissipation	P _D (T _A =25°C)	2	W
	P _D (T _A =70°C)	1.3	W
Maximum Operating Junction Temperature	T _J	150	°C
Storage Temperature Range	T _{STG}	-55 To 150	°C

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THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}(t \leq 10s)$	25	$^{\circ}C/W$
	$R_{\theta JA}(\text{Steady State})$	60	$^{\circ}C/W$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}(\text{Steady State})$	2.4	$^{\circ}C/W$

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}C$ unless otherwise noted)

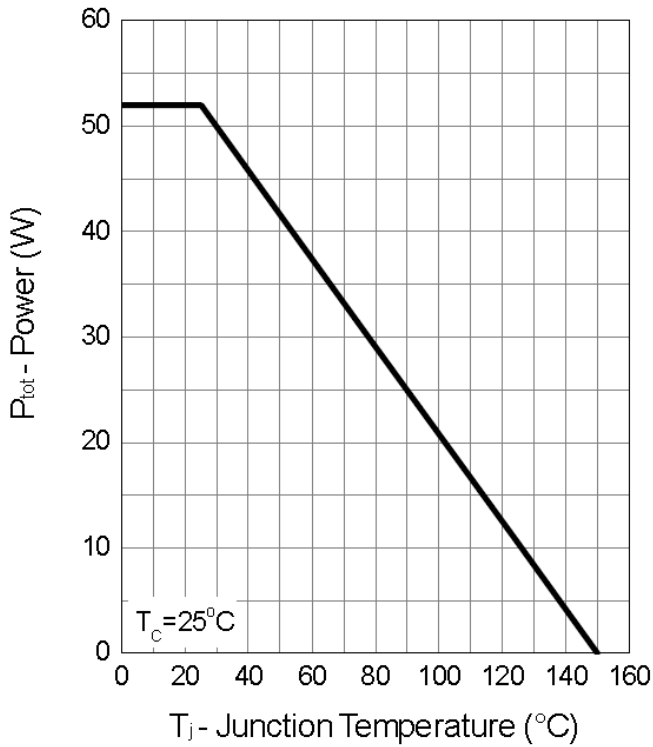
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=48V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	2	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=25A$	-	10.2	13	$m\Omega$
		$V_{GS}=10V, I_D=25A$	-	8.8	10.5	$m\Omega$
DYNAMIC CHARACTERISTICS (Note 4)						
Gate Resistance	R_G	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	1.0	-	Ω
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, F=1.0MHz$	-	2500	3500	PF
Output Capacitance	C_{oss}		-	215	-	PF
Reverse Transfer Capacitance	C_{rss}		-	105	-	PF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=30V, R_L=30\Omega, V_{GEN}=10V, R_G=6\Omega, I_D=1A$	-	18	33	nS
Turn-on Rise Time	t_r		-	10	18	nS
Turn-Off Delay Time	$t_{d(off)}$		-	73	131	nS
Turn-Off Fall Time	t_f		-	27	49	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=10A, V_{GS}=10V$	-	45	65	nC
Gate-Source Charge	Q_{gs}		-	9	-	nC
Gate-Drain Charge	Q_{gd}		-	8.5	-	nC
Body Diode Reverse Recovery Time	T_{rr}	$I_F=10A, di/dt=100A/\mu s$	-	28	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	35	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=5A$	-	0.8	1.3	V

NOTES:

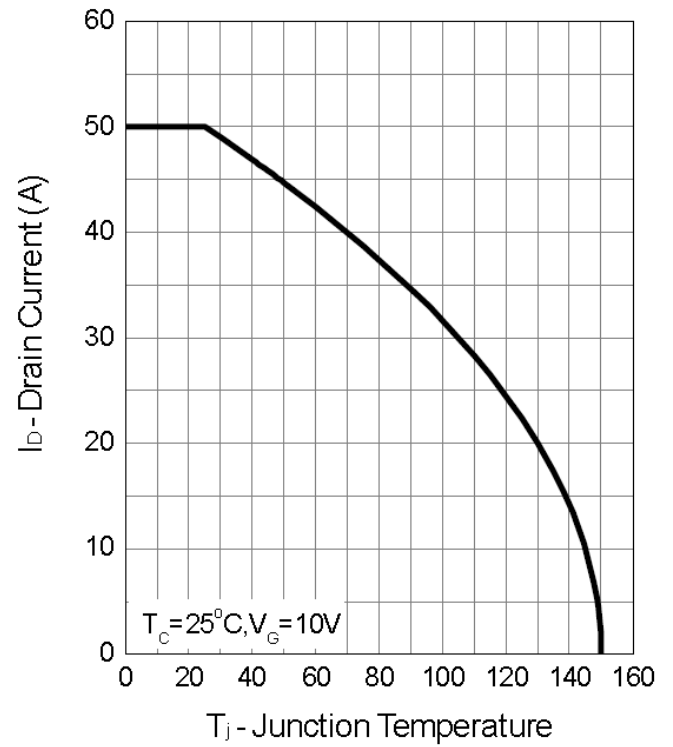
- Package is limited to 100A
- Pulse width limited by max. junction temperature.
- Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing

Typical Operating Characteristics

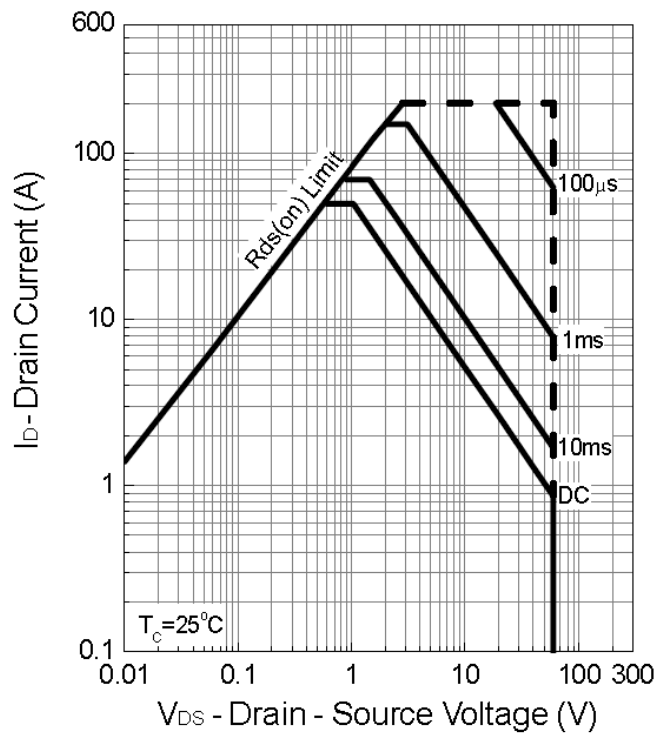
Power Dissipation



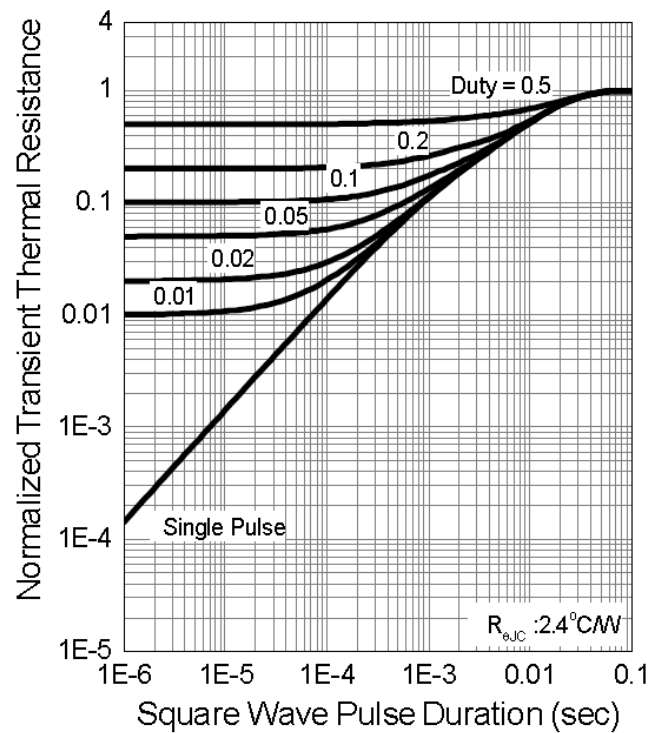
Drain Current



Safe Operation Area

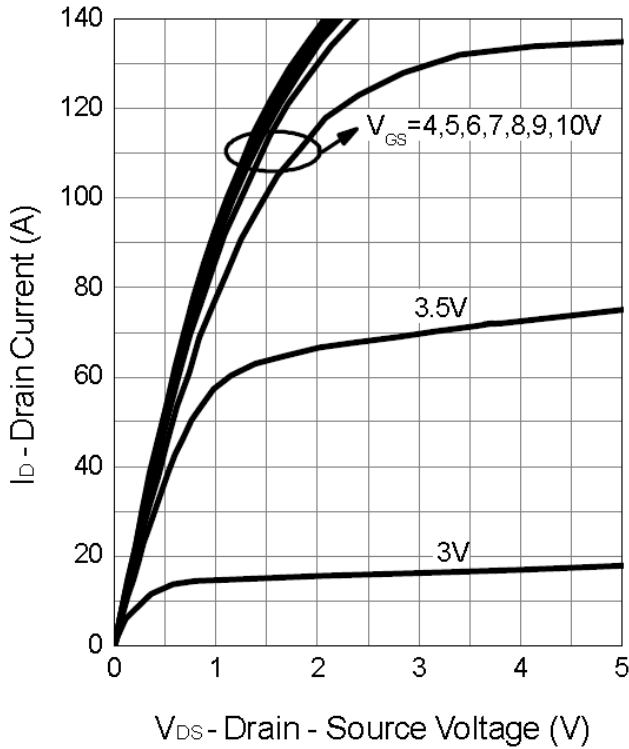


Thermal Transient Impedance

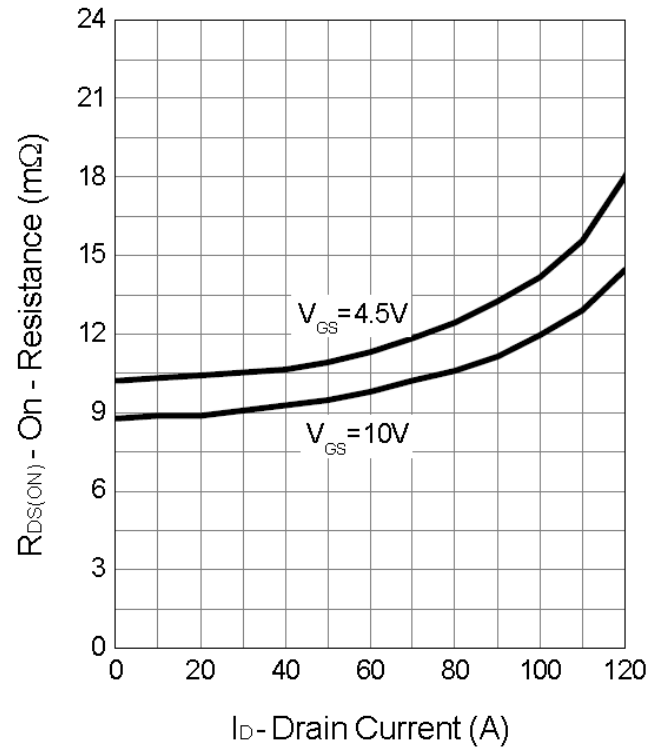


Typical Operating Characteristics(Cont.)

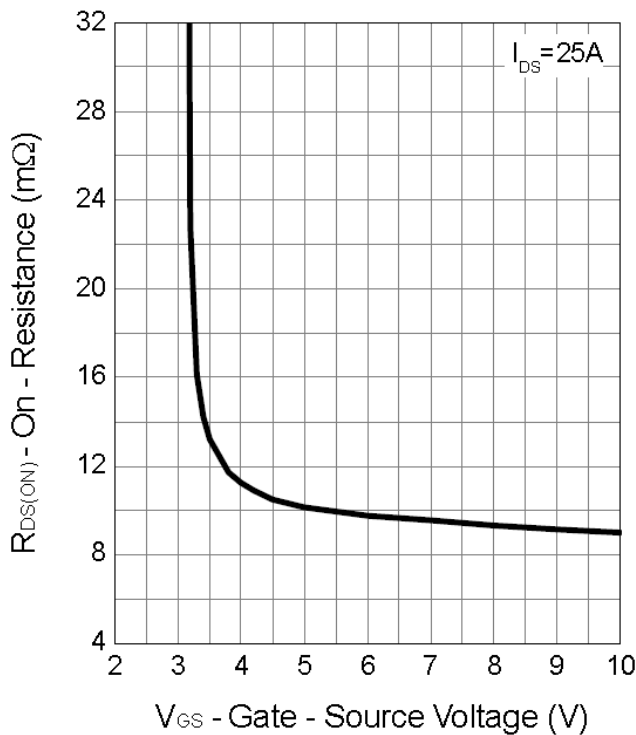
Output Characteristics



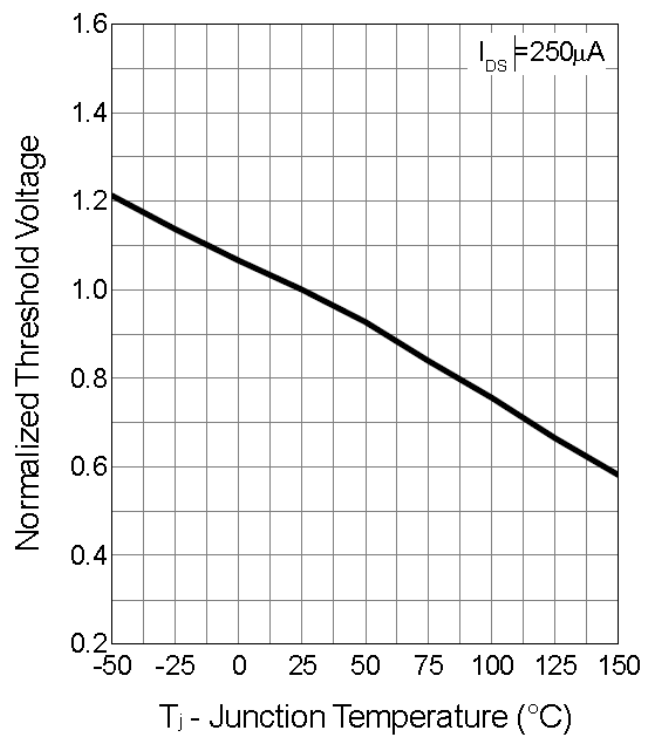
Drain-Source On Resistance



Gate-Source On Resistance

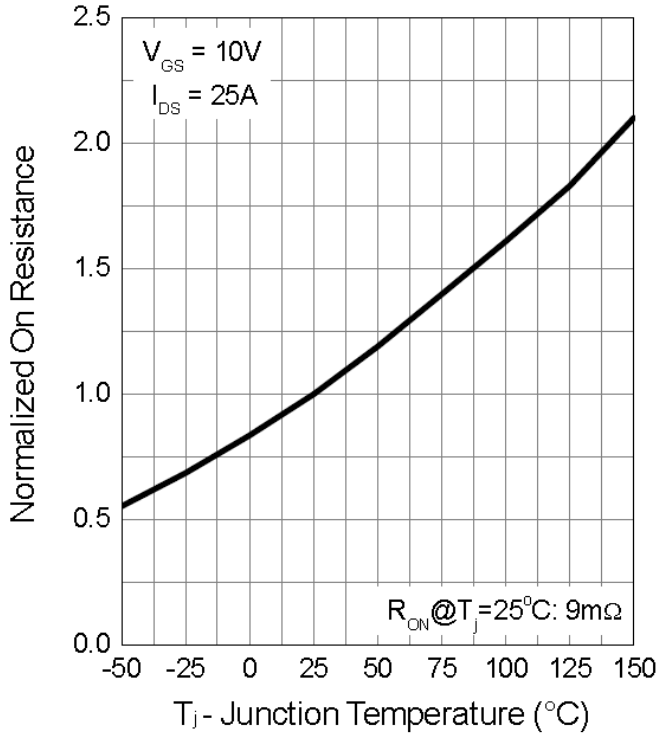


Gate Threshold Voltage

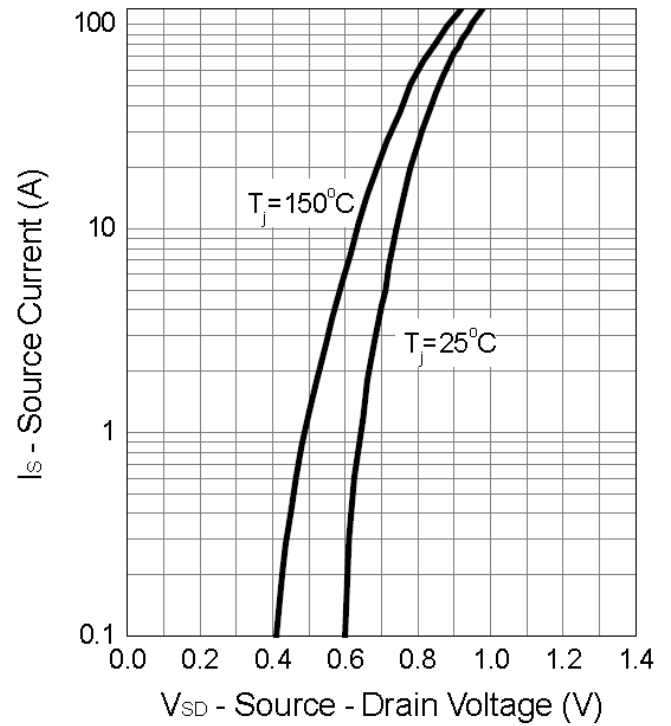


Typical Operating Characteristics (Cont.)

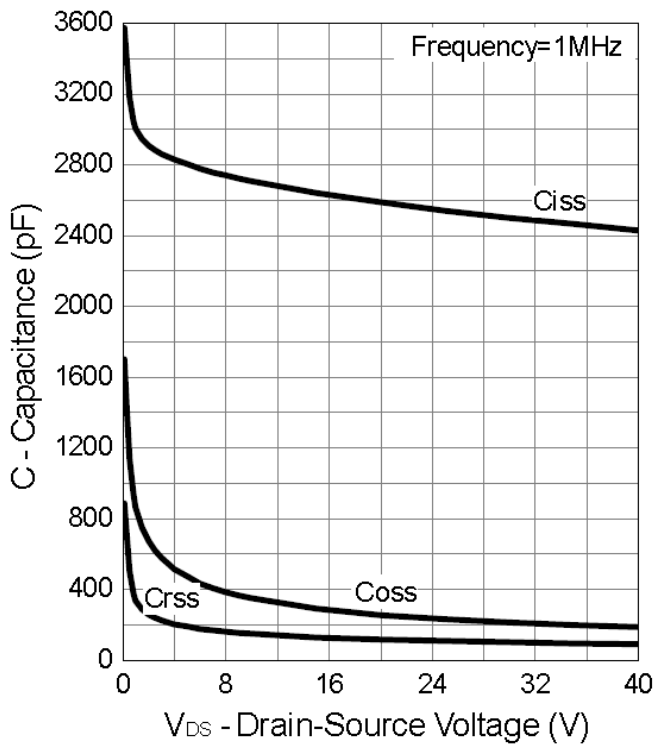
Drain-Source On Resistance



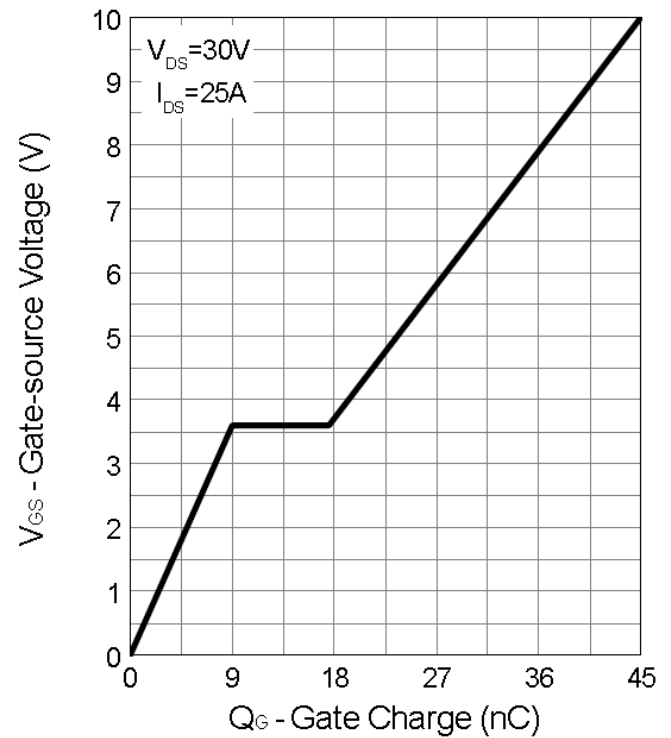
Source-Drain Diode Forward



Capacitance

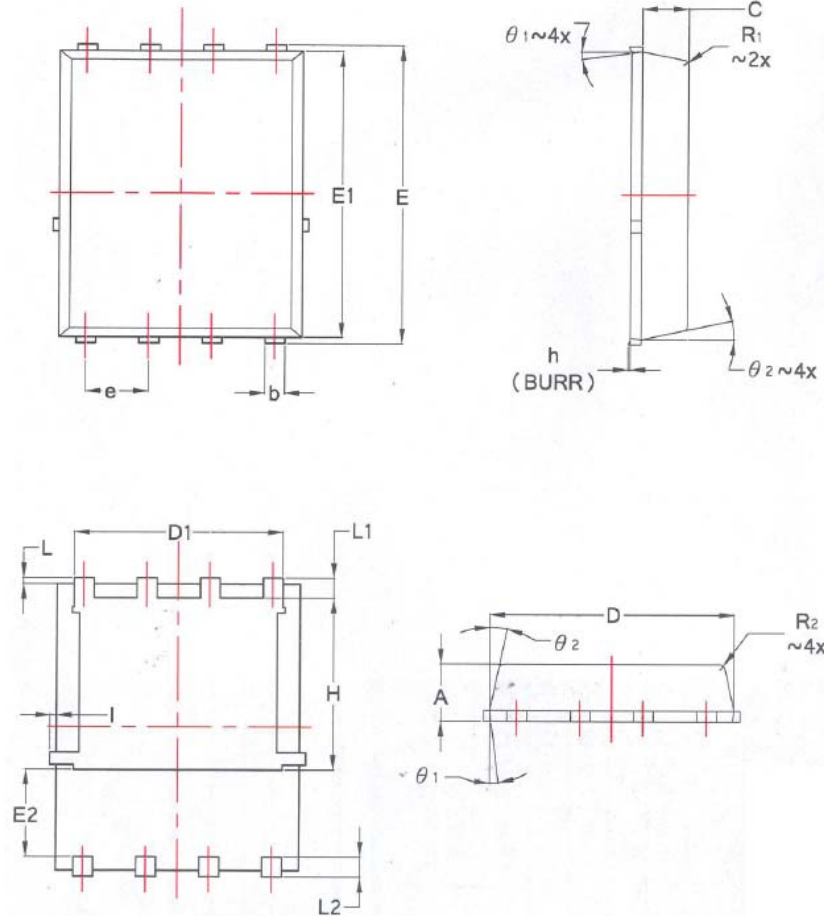


Gate Charge



Package Information

DFN5X6-8 Package



SYMBOL	COMMON			
	MM		INCH	
	MIN.	MAX.	MIN.	MAX.
A	1.03	1.17	0.0406	0.0461
b	0.35	0.46	0.0138	0.0181
C	0.84	0.95	0.0331	0.0374
D	4.83	4.97	0.1902	0.1957
D1	4.14	4.28	0.1630	0.1685
E	6.03	6.13	0.2374	0.2413
E1	5.68	5.82	0.2236	0.2291
E2	1.65	—	0.0650	—
e	1.27 BSC		0.05 BSC	
L	0.125	0.195	0.0049	0.0077
L1	0.40	0.48	0.0157	0.0189
L2	0.40	0.48	0.0157	0.0189
H	3.55	3.65	0.1398	0.1437
I	—	0.16	—	0.0063
R1	0.1		0.004	
R2	0.1		0.004	
theta_1	7°		7°	
theta_2	12°		12°	
h	0.08MAX		0.0031MAX	

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. MOLD FLASH PROTRUSION OR GATE BURRS SHALL NOT EXCEED 0.127mm PER END

Design Notes