N-Channel Enhancement Mode MOSFET TDM3646

DESCRIPTION

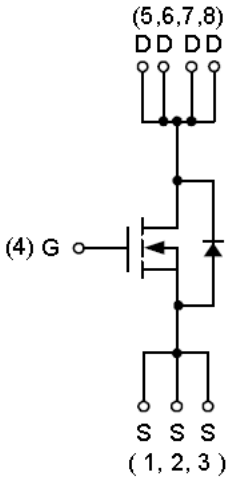
The TDM3646 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

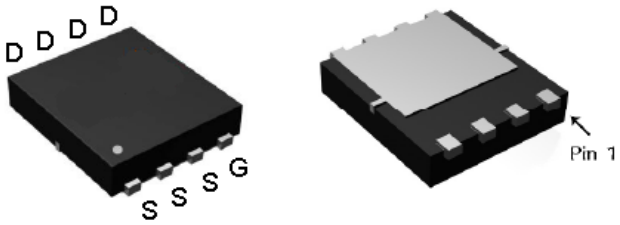
GENERAL FEATURES

- RDS(ON) < 7mΩ @ VGS=4.5V
  RDS(ON) < 5.6mΩ @ VGS=10V
- High Power and current handling capability
- Surface Mount Package
- Lead Free and Green Devices available(RoHS Compliant)

Application

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





DFN5x6-8

ABSOLUTE MAXIMUM RATINGS(T_A=25℃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℃）	40	A
Drain Current @ Continuous(Note 1)	I_D（T_C=25℃）	80	A
	I_D（T_C=100℃）	59	A
Drain Current @ Current-Pulsed (Note 2)	I_{DM}（T_C=25℃）	300	A
Maximum Power Dissipation	P_D（T_C=25℃）	96	W
	P_D（T_C=100℃）	38	W
Drain Current @ Continuous(Note 1)	I_D（T_A=25℃）	13	A
	I_D（T_A=70℃）	11	A
Maximum Power Dissipation	P_D（T_A=25℃）	2	W
	P_D（T_A=70℃）	1.3	W
Maximum Operating Junction Temperature	T_J	150	℃
Storage Temperature Range	T_{STG}	-55 To 150	℃

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$（t≤10s）	20	℃/W
	$R_{\theta JA}$（Steady State）	60	℃/W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$（Steady State）	1.3	℃/W

ELECTRICAL CHARACTERISTICS (T_A=25℃unless otherwise noted)

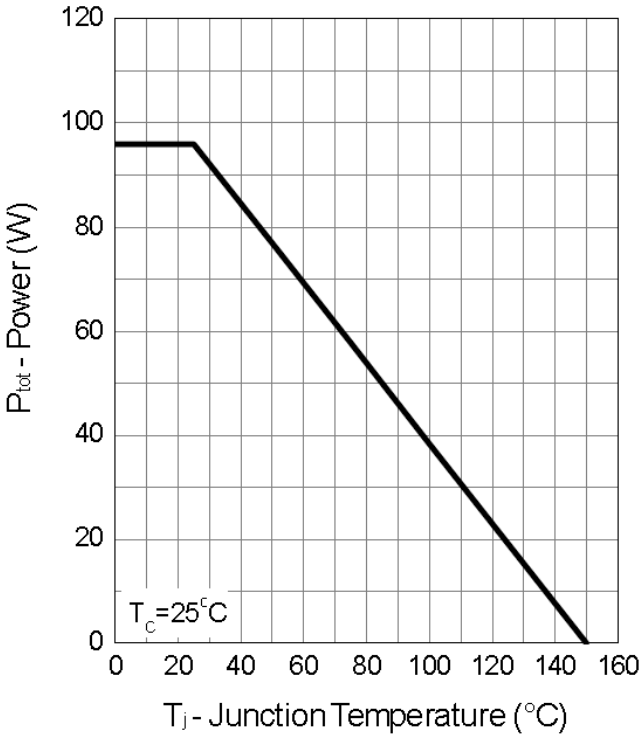
Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=48V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1	2	3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=25A	-	5.6	7	mΩ
		V_{GS}=10V, I_D=25A	-	4.9	5.6	mΩ
DYNAMIC CHARACTERISTICS (Note4)						
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	-	4347	6100	PF
Output Capacitance	C_{oss}		-	428	-	PF
Reverse Transfer Capacitance	C_{rss}		-	220	-	PF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=30V, R_L=30Ω, V_{GEN}=10V,R_G=6Ω	-	25	45	nS
Turn-on Rise Time	t_r	I_D=1A	-	12	22	nS
Turn-Off Delay Time	$t_{d(off)}$		-	90	162	nS
Turn-Off Fall Time	t_f		-	38	69	nS
Total Gate Charge	Q_g	V_{DS}=30V,I_D=30A,V_{GS}=10V	-	83	117	nC
Gate-Source Charge	Q_{gs}		-	17	-	nC
Gate-Drain Charge	Q_{gd}		-	15	-	nC
Body Diode Reverse Recovery Time	T_{rr}	I_F=30A, dI/dt=100A/μs	-	33	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	41	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=20A	-	0.8	1.3	V

NOTES:

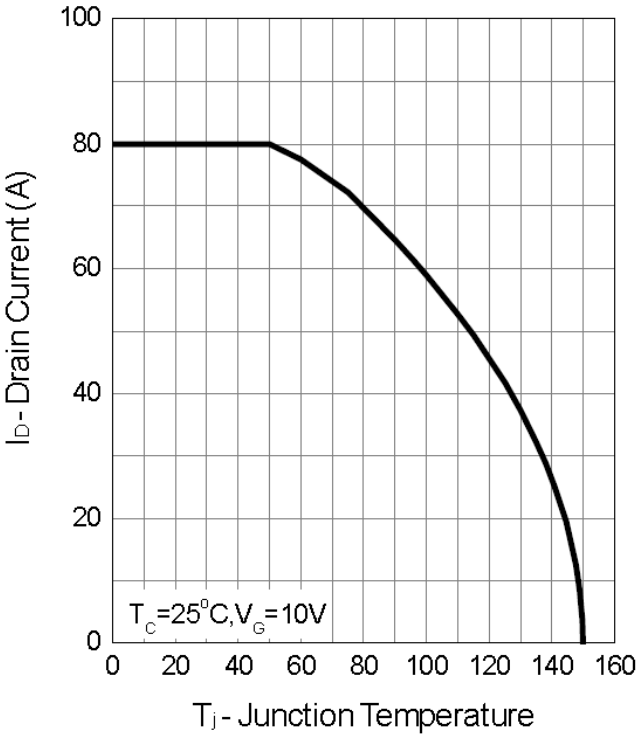
1. Current limited by bonding wire
2. Pulse width limited by max. Junction temperature.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

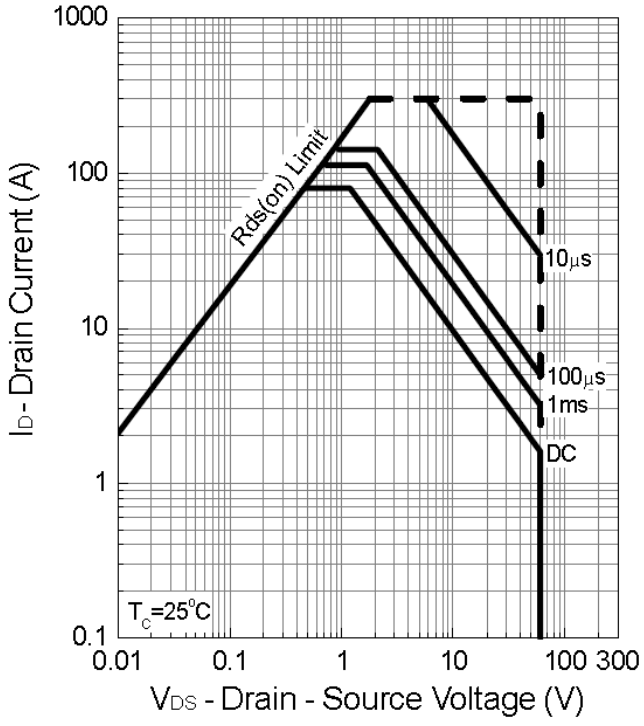
Power Dissipation



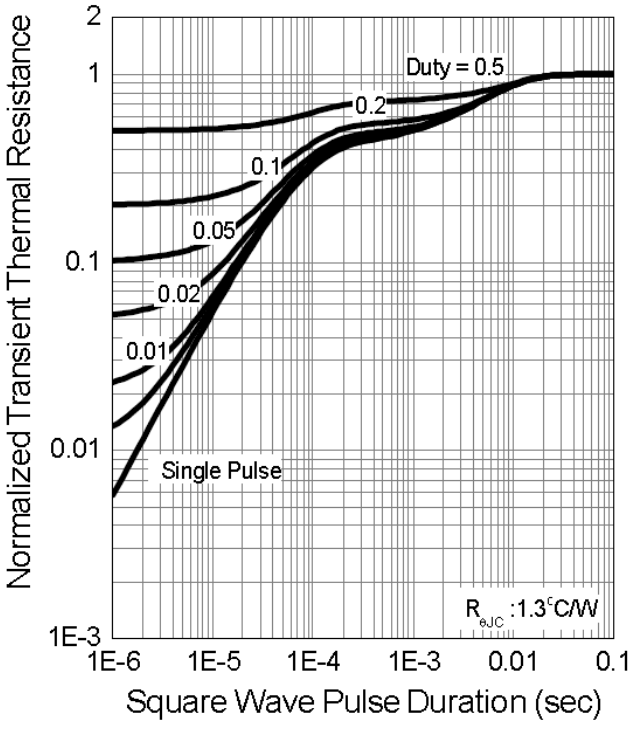
Drain Current



Safe Operation Area

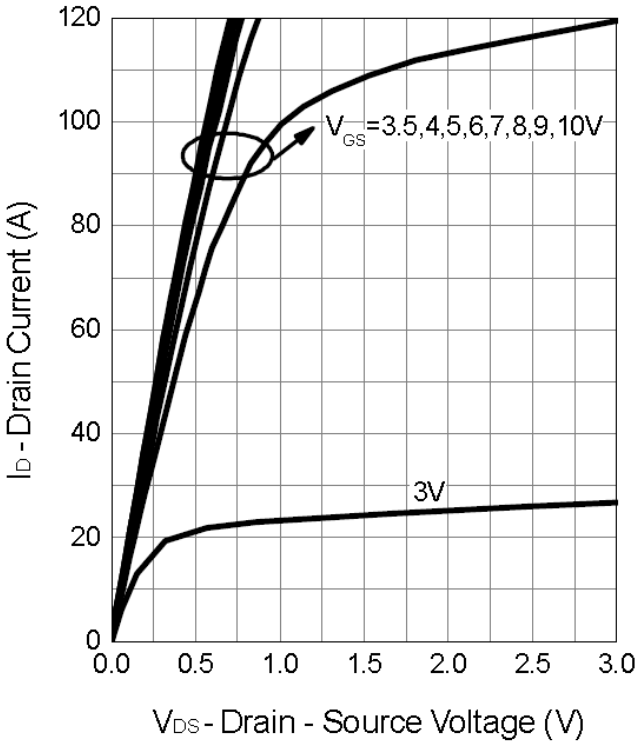


Thermal Transient Impedance

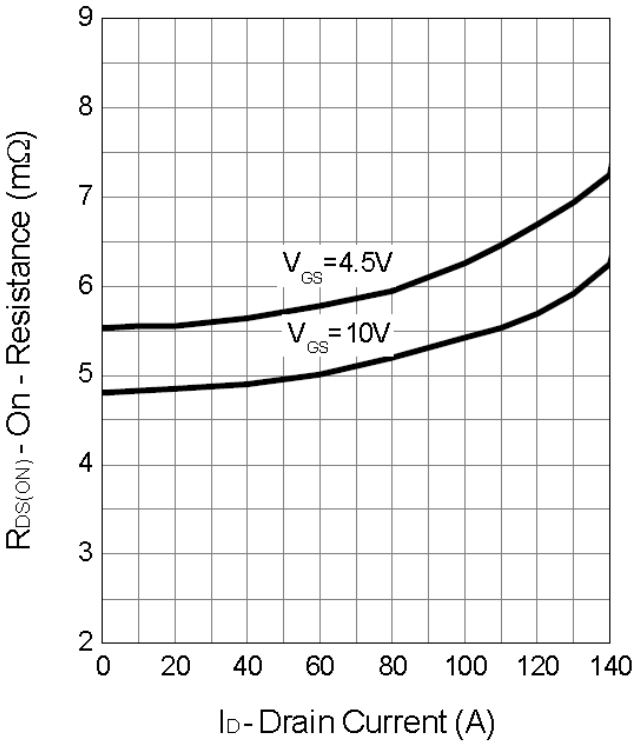


Typical Operating Characteristics(Cont.)

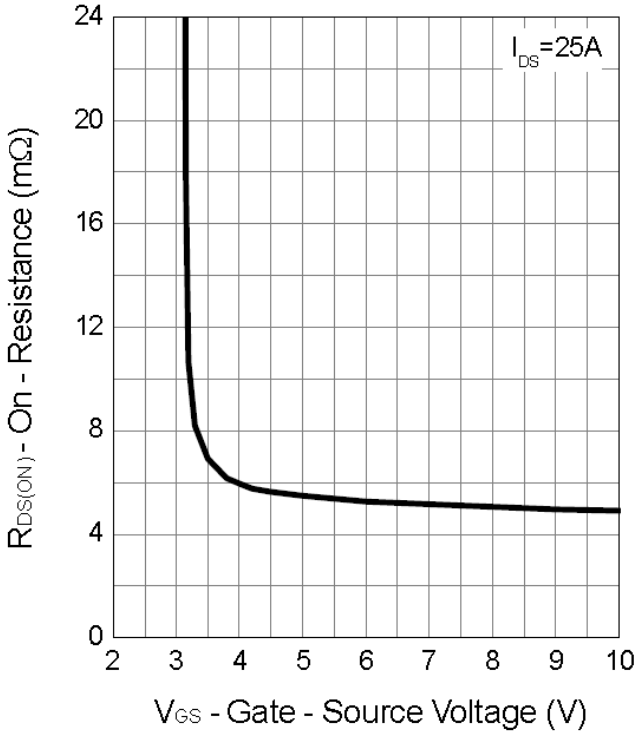
Output Characteristics



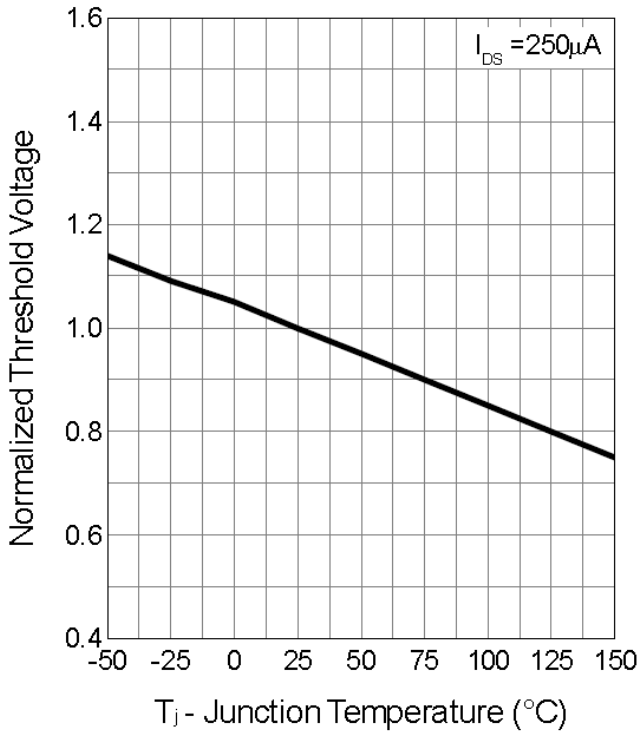
Drain-Source On Resistance



Gate-Source On Resistance

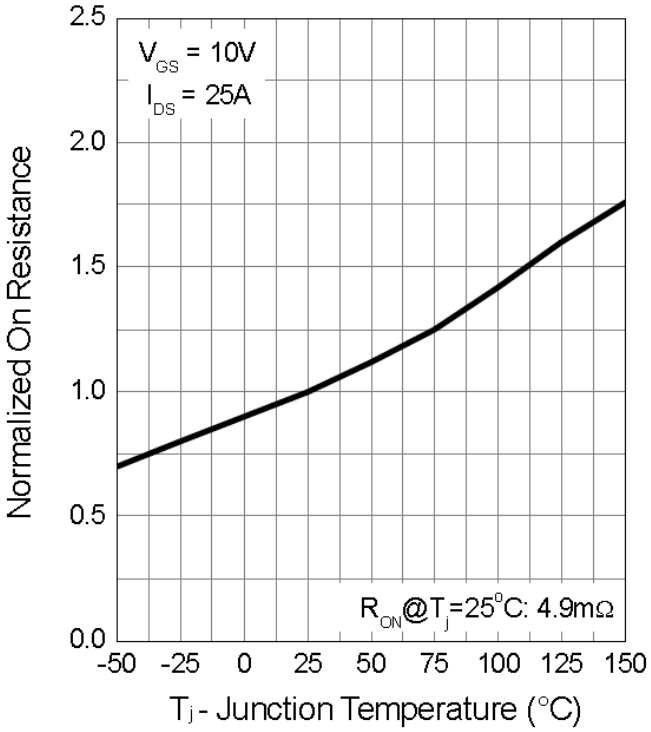


Gate Threshold Voltage

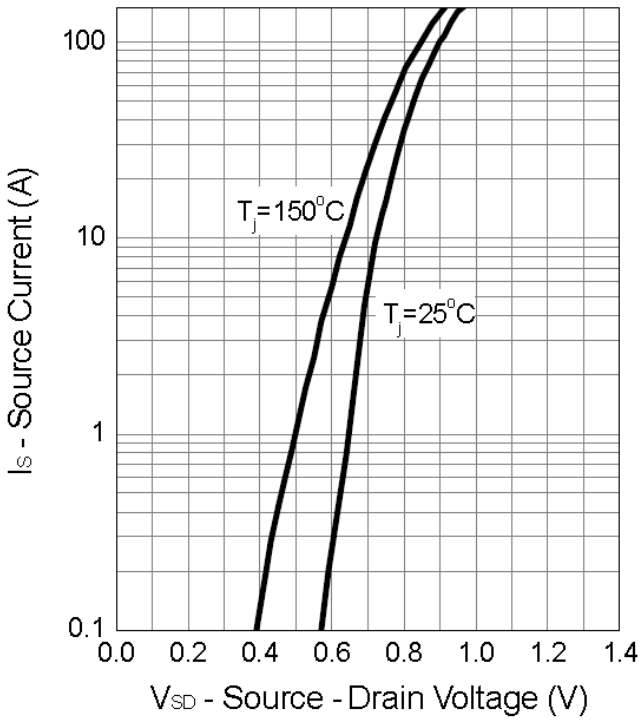


Typical Operating Characteristics (Cont.)

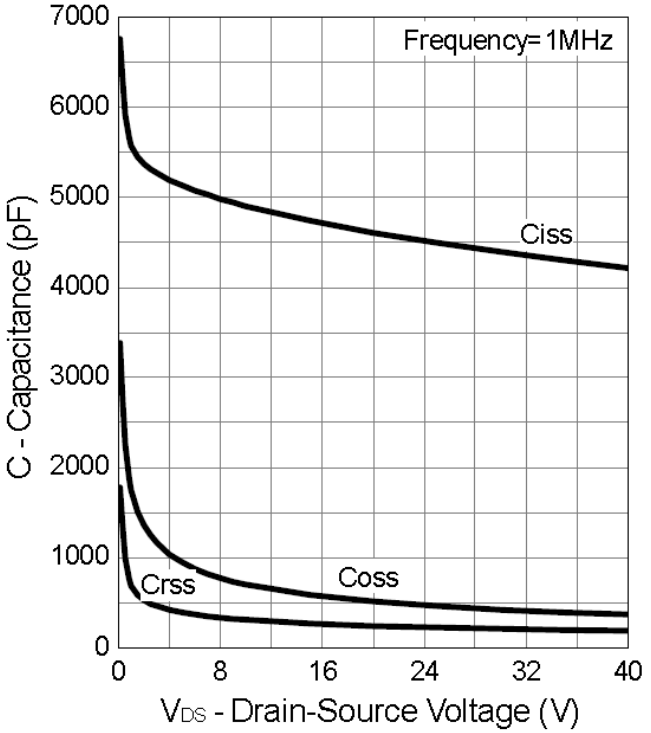
Drain-Source On Resistance



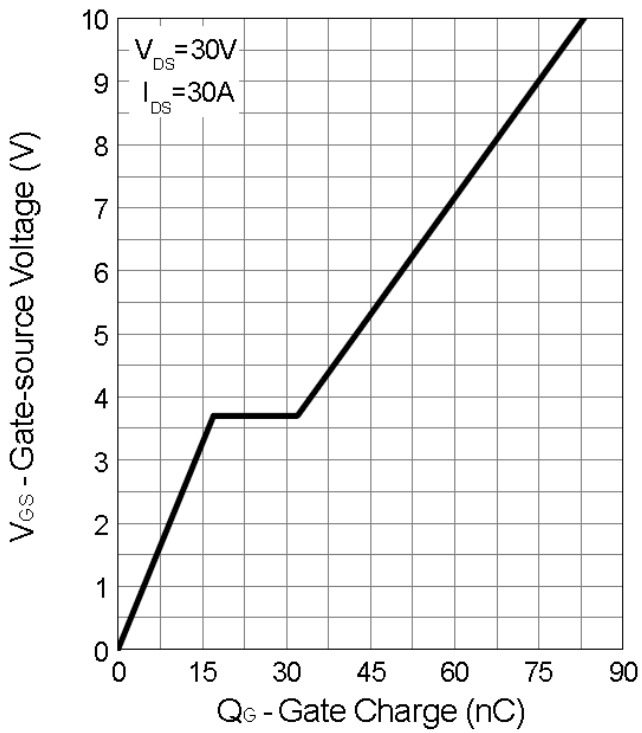
Source-Drain Diode Forward



Capacitance

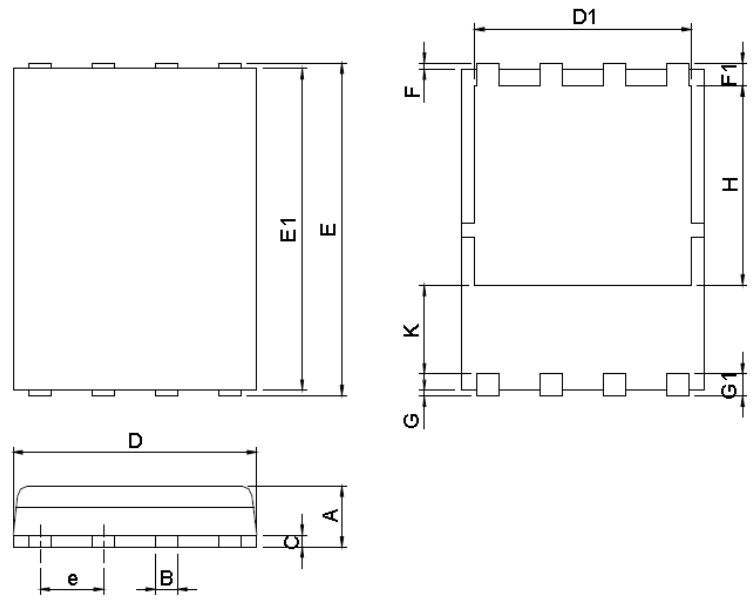


Gate Charge



Package Information

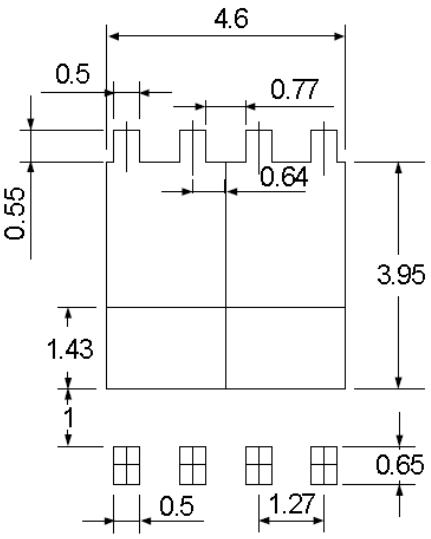
DFN5*6-8 Package



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