

N-Channel Enhancement Mode MOSFET

TDM3408

**DESCRIPTION**

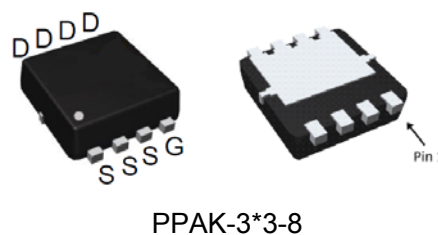
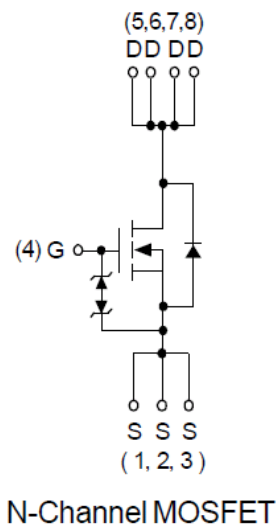
The TDM3408 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

**GENERAL FEATURES**

- RDS(ON) < 17.5mΩ @ VGS=4.5V  
RDS(ON) < 10.8mΩ @ VGS=10V
- High Power and current handling capability
- ESD protection
- Lead free product is available
- Surface Mount Package

**Application**

- PWM applications
- Load switch
- Power management



**ABSOLUTE MAXIMUM RATINGS**( $T_A=25^{\circ}C$  unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V <sub>DS</sub>	30	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Diode Continuous Forward Current	I <sub>S</sub>	5	A
Drain Current @ Continuous	I <sub>D</sub> (T <sub>C</sub> =25°C)	20	A
Drain Current @ Current-Pulsed (Note 1)	I <sub>DM</sub> (T <sub>C</sub> =25°C)	48	A
Maximum Power Dissipation	P <sub>D</sub> (T <sub>C</sub> =25°C)	21	W
Drain Current @ Continuous	I <sub>D</sub> (T <sub>A</sub> =25°C)	9.2	A
	I <sub>D</sub> (T <sub>A</sub> =70°C)	7.4	A
Maximum Power Dissipation	P <sub>D</sub> (T <sub>A</sub> =25°C)	1.4	W
	P <sub>D</sub> (T <sub>A</sub> =70°C)	0.9	W
Thermal Resistance, Junction-to-Ambient (Note 4)	R <sub>θJA</sub> (t≤10s)	35	°C/W
	R <sub>θJA</sub> (Steady State)	70	°C/W
Maximum Operating Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 To 150	°C

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**TDM3408**
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

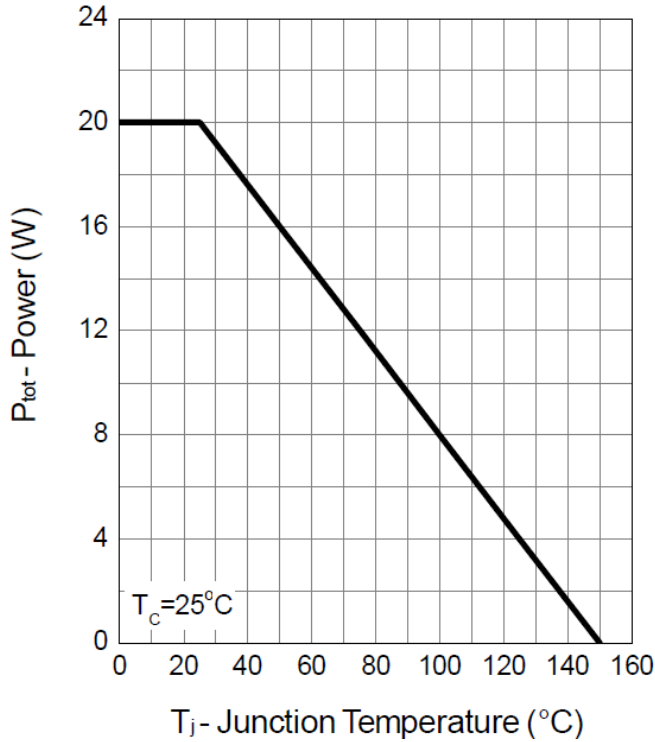
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>ON CHARACTERISTICS</b> (Note 2)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=8A$	-	12.3	17.5	m $\Omega$
		$V_{GS}=10V, I_D=10A$	-	8.2	10.8	m $\Omega$
<b>DYNAMIC CHARACTERISTICS</b> (Note3)						
Gate Resistance	$R_G$	$V_{DS}=20V, V_{GS}=0V, F=1.0MHz$	-	1.4	2.5	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, F=1.0MHz$	-	455	600	PF
Output Capacitance	$C_{oss}$		-	320	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	22	-	PF
<b>SWITCHING CHARACTERISTICS</b> (Note 3)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=15V, R_L=15\Omega, V_{GEN}=10V, R_G=6\Omega, I_D=1A$	-	8.5	16	nS
Turn-on Rise Time	$t_r$		-	10	18	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	26	nS
Turn-Off Fall Time	$t_f$		-	10.6	19	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=10A, V_{GS}=10V$	-	8	12	nC
Gate-Source Charge	$Q_{gs}$		-	1.6	-	nC
Gate-Drain Charge	$Q_{gd}$		-	1.2	-	nC
Body Diode Reverse Recovery Time	$T_{rr}$	$I_F=10A, di/dt=100A/\mu s$	-	20.5	-	nS
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	7.2	-	nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode Forward Voltage (Note 2)	$V_{SD}$	$V_{GS}=0V, I_S=5A$	-	0.8	1.3	V

**NOTES:**

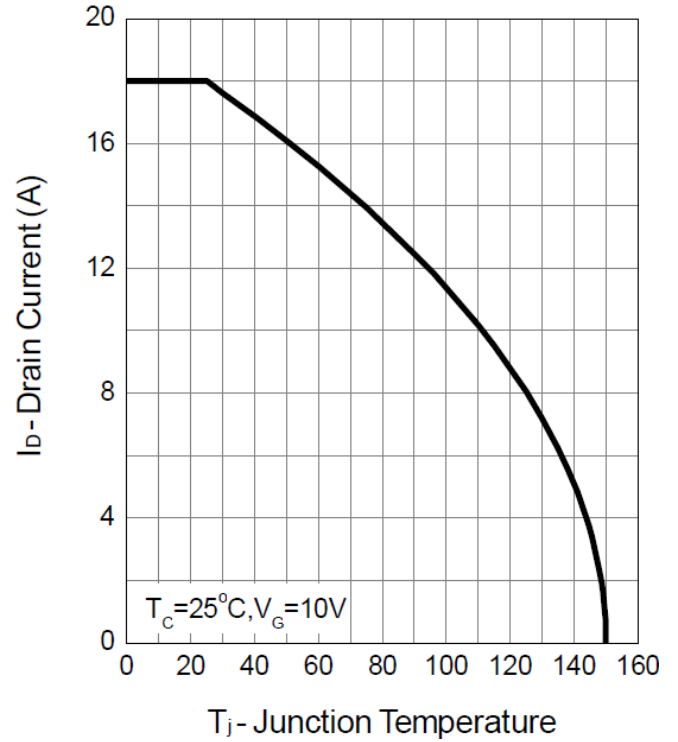
- Pulse width limited by max. junction temperature.
- Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing
- $R_{\theta JA}$  steady state  $t=100s$ .  $R_{\theta JA}$  is measured with the device mounted on 1in2, FR-4 board with 2oz. Copper.

Typical Operating Characteristics

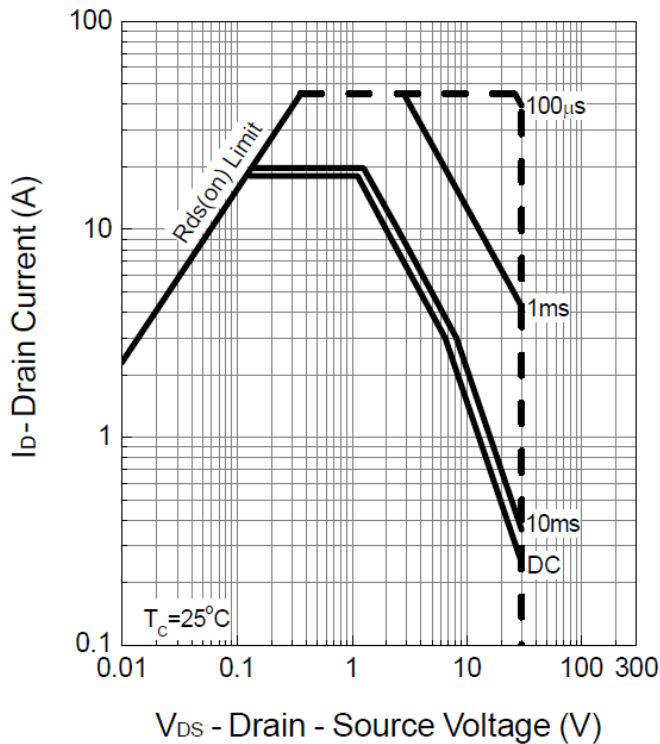
Power Dissipation



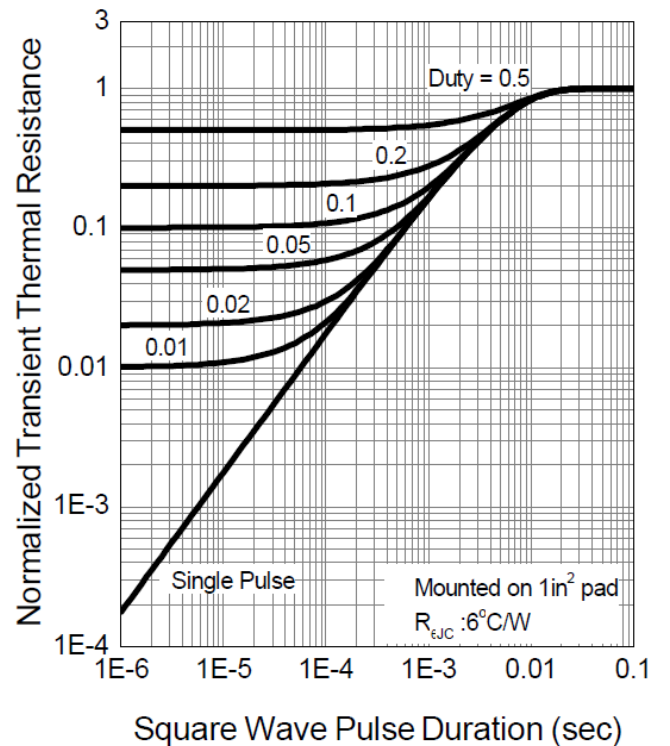
Drain Current



Safe Operation Area

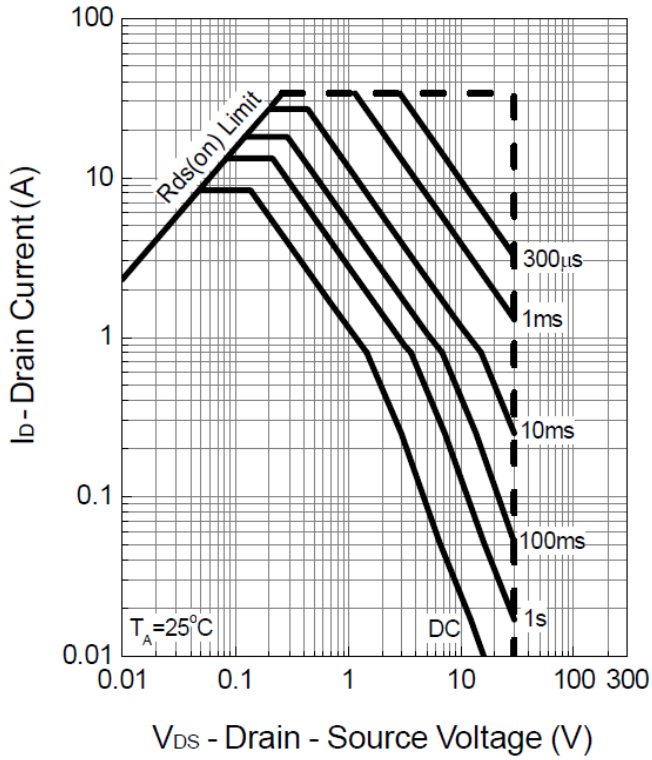


Thermal Transient Impedance

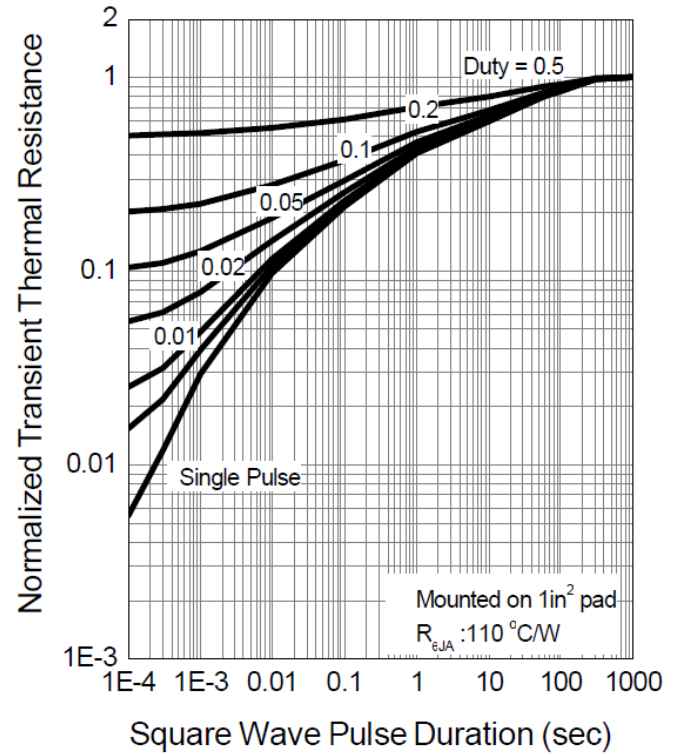


Typical Operating Characteristics(Cont.)

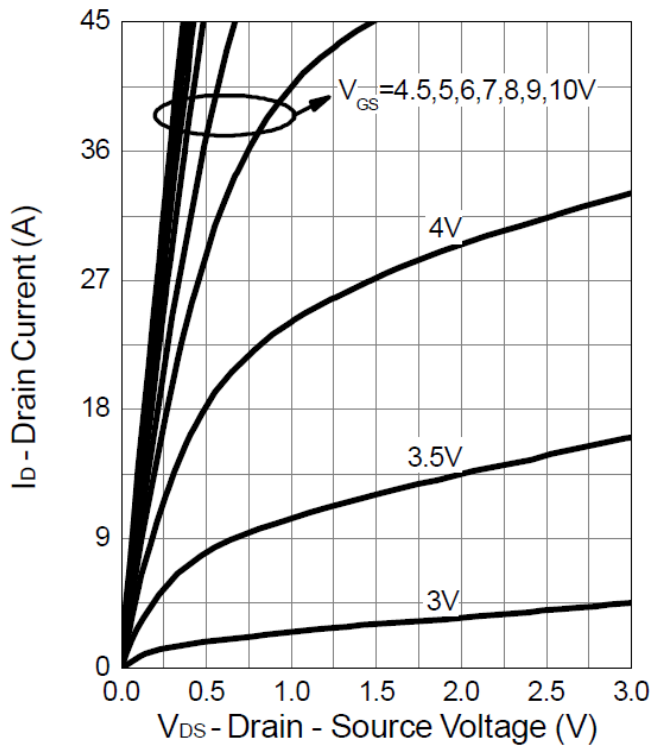
Safe Operation Area



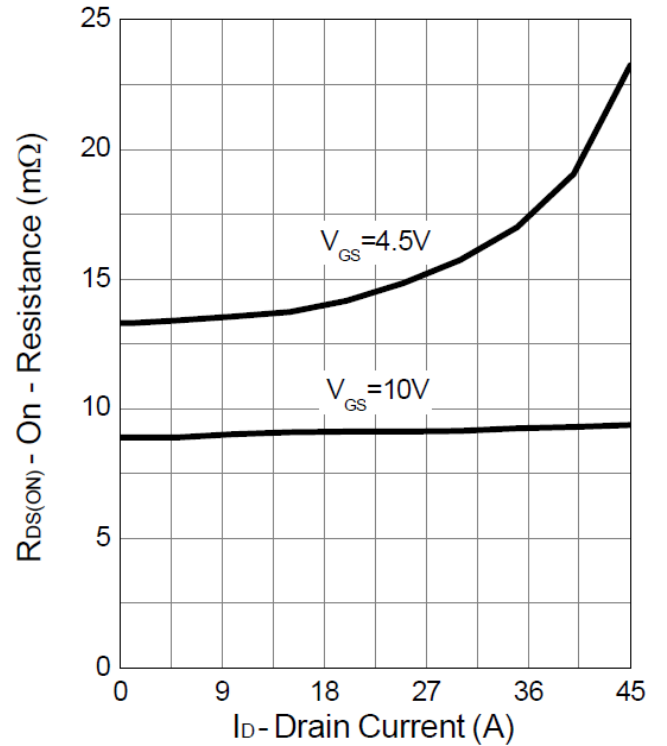
Thermal Transient Impedance



Output Characteristics

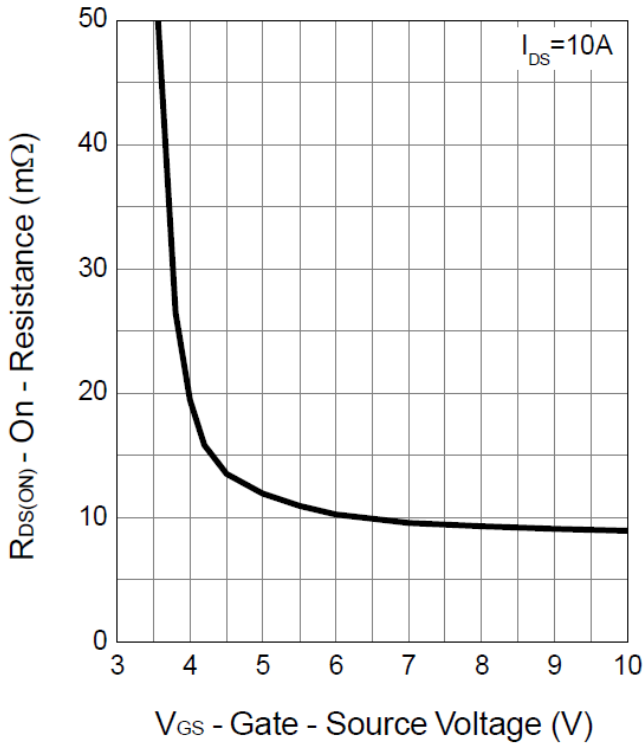


Drain-Source On Resistance

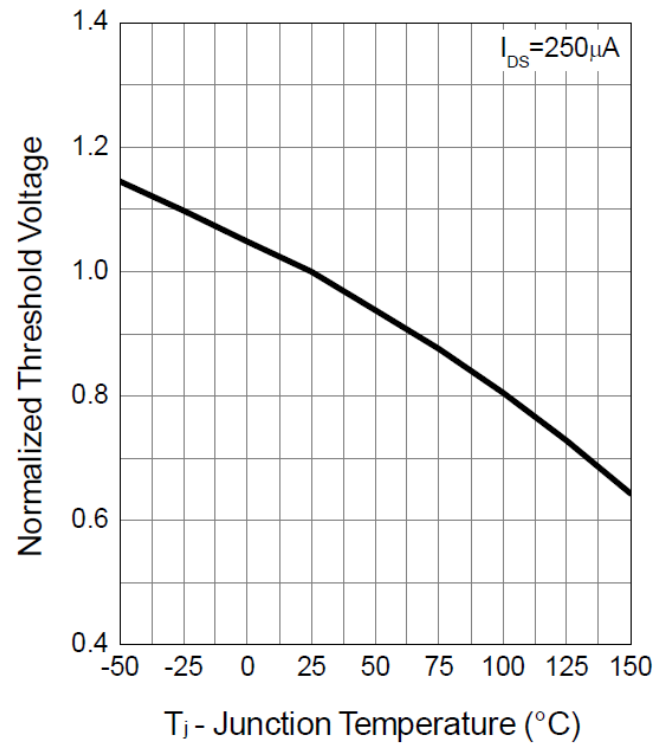


Typical Operating Characteristics(Cont.)

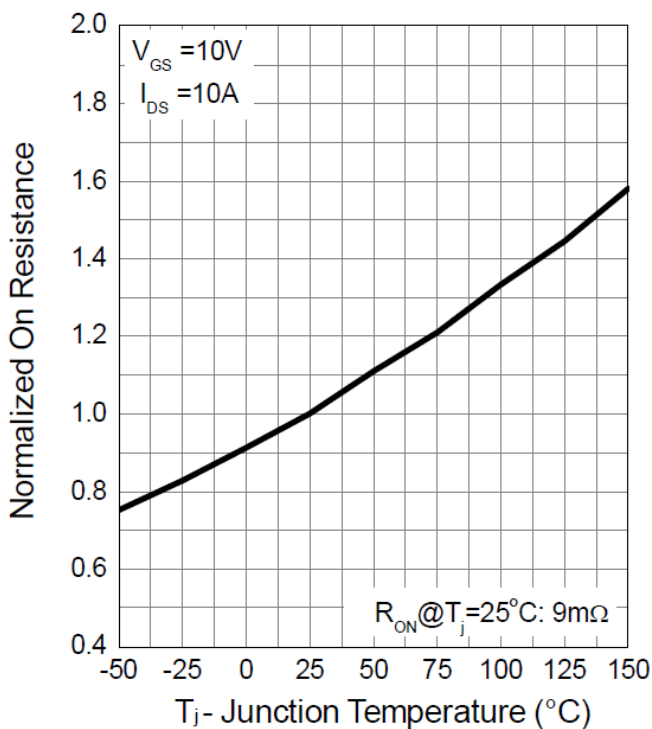
Gate-Source On Resistance



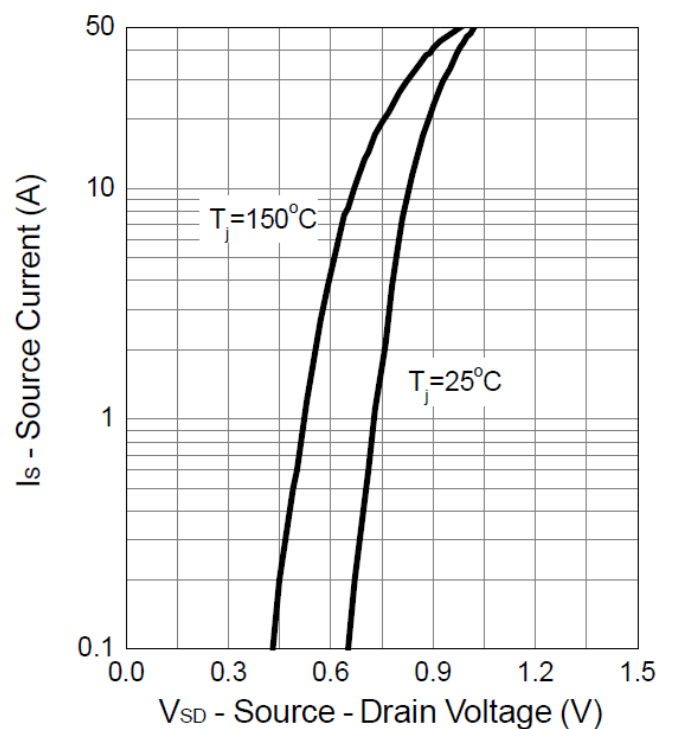
Gate Threshold Voltage



Drain-Source On Resistance

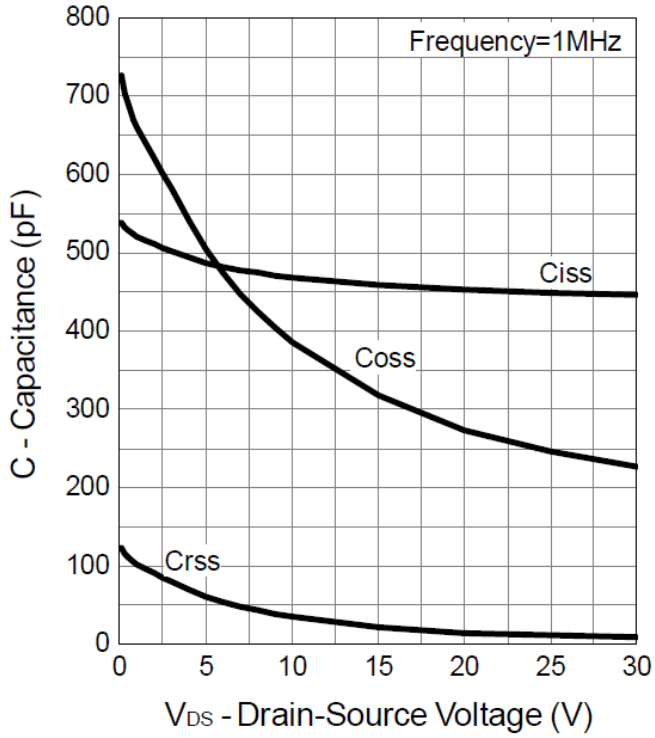


Source-Drain Diode Forward

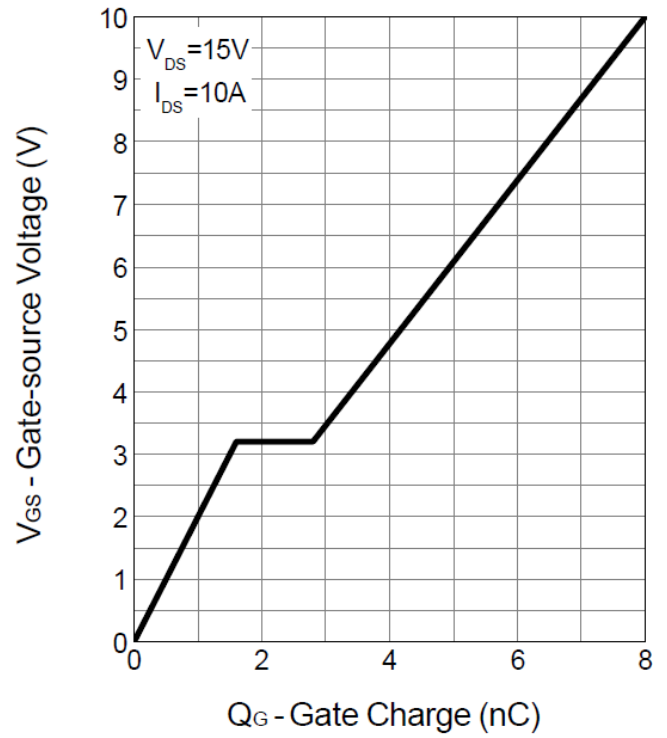


Typical Operating Characteristics(Cont.)

Capacitance

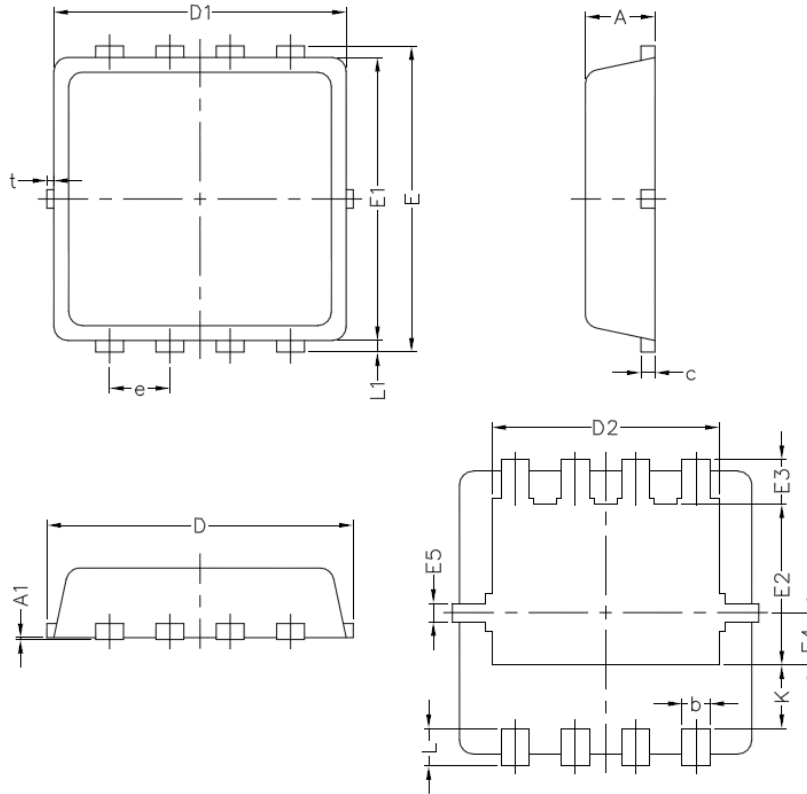


Gate Charge



Package Information

PPAK-3\*3-8 Package



Symbol	PPAK-3*3-8(mm)		
	Min	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.3	3.45
D1	3.00	3.15	3.30
D2	2.25	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.68
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.49	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	/	/	0.13

Design Notes