N-Channel Enhancement Mode MOSFET TDM3578

DESCRIPTION

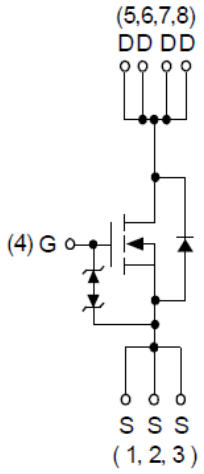
The TDM3578 uses advanced trench technology to provide excellent RDS(ON) and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

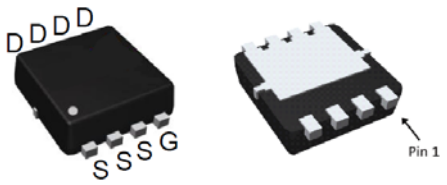
- RDS(ON) <6.7mΩ @ VGS=10V
  RDS(ON) < 10.3mΩ @ VGS=4.5V
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management



N-Channel MOSFET



PPAK-3*3-8

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℃）	20	A
Drain Current @ Continuous	I_D（T_C=25℃）	61	A
	I_D（T_C=100℃）	43	A
Drain Current @ Current-Pulsed	I_{DM}（T_C=25℃）	244	A
Maximum Power Dissipation (T_C=25℃)	P_D(T_C=25℃)	50	W
	P_D(T_C=100℃)	23.5	W
Drain Current @ Continuous(Note a)	I_D（T_A=25℃）	14.2	A
	I_D（T_A=70℃）	12	A
Drain Current @ Current-Pulsed (Note b)	I_{DM}（T_A=25℃）	57	A
Maximum Power Dissipation(Note a)	P_D(T_A=25℃)	2.5	W
	P_D(T_A=70℃)	1.8	W
Maximum Operating Junction Temperature	T_J	175	℃
Storage Temperature Range	T_{STG}	-55 To 175	℃
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	4.5	℃/W
Thermal Resistance,Junction-to-Ambient (Note a)	$R_{\theta JA}$	60	℃/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	-	-	±10	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=VGS,I_D=250μA	1.4	1.7	2.5	V
Drain-Source On-State Resistance(Note d)	$R_{DS(ON)}$	V_{GS}=10V, I_D=20A	-	5.6	6.7	mΩ
		V_{GS}=4.5V, I_D=15A	-	7.9	10.3	mΩ
DYNAMIC CHARACTERISTICS						
Gate Resistance	R_G	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	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	-	11.3	21-	nS
Turn-on Rise Time	t_r	I_{DS}=1A	-	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 e)						
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						
Body Diode Reverse Recovery Time	T_{rr}	I_{DS}=20A, dI/dt=100A/μs	-	18.3	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	6.4	-	nC
Diode Forward Voltage (Note d)	V_{SD}	V_{GS}=0V,I_S=20A	-	0.8	1.1	V

NOTES:

a. Surface mounted on 1in^2 pad area, steady state t = 999s.

b. Pulse width limited by max. junction temperature..

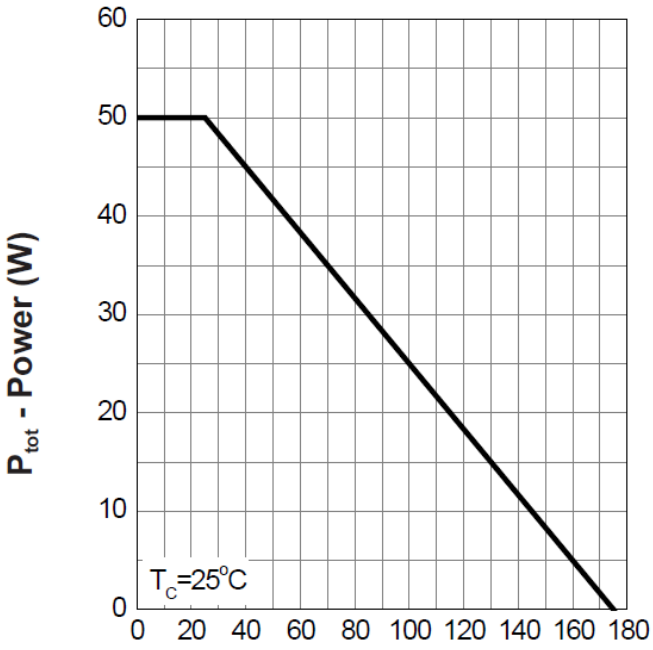
c. UIS tested and pulse width limited by maximum junction temperature 175°C (initial temperature Tj=25°C).

d. Pulse test ; pulse width≤300ms, duty cycle≤2%.

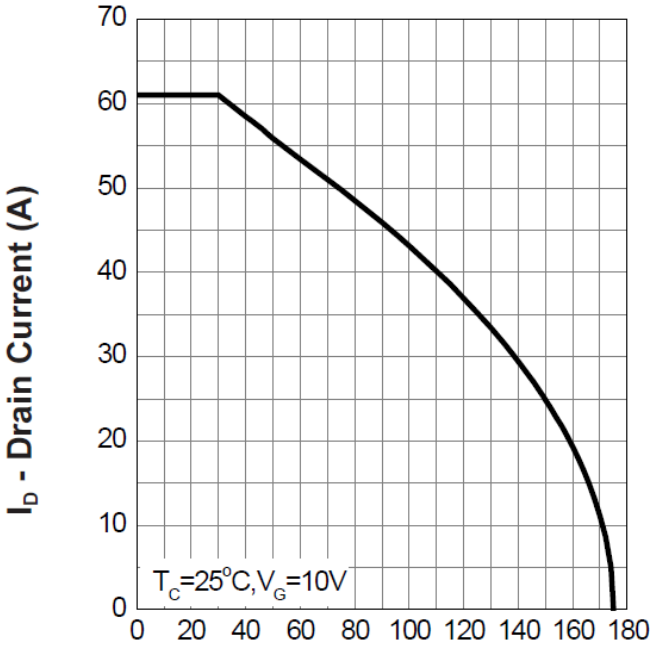
e. Guaranteed by design, not subject to production testing

Typical Operating Characteristics

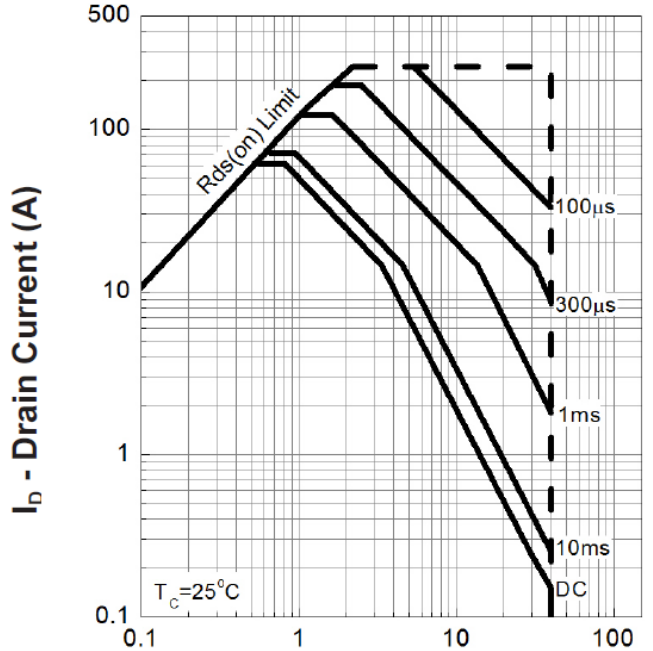
Power Dissipation



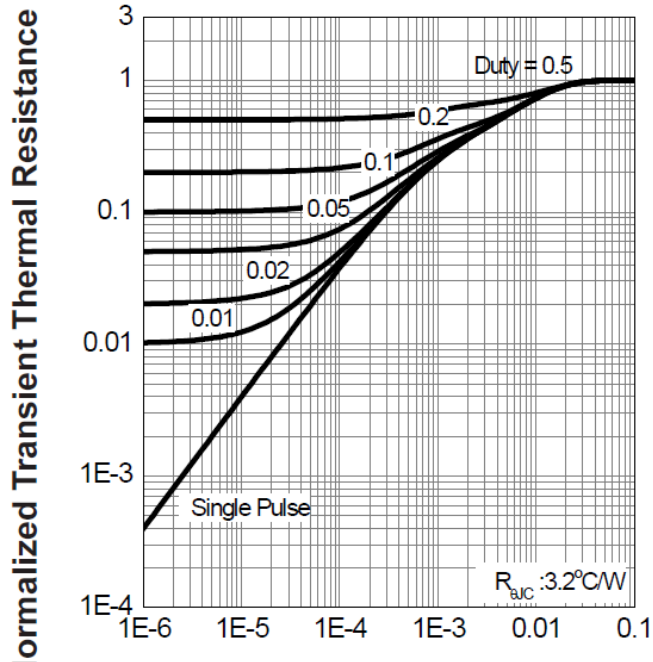
Drain Current



Safe Operation Area

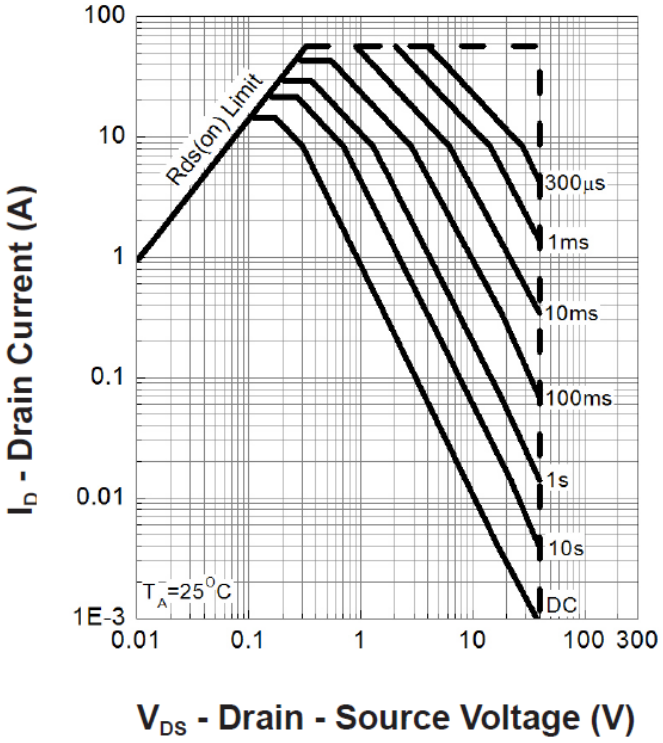


Thermal Transient Impedance

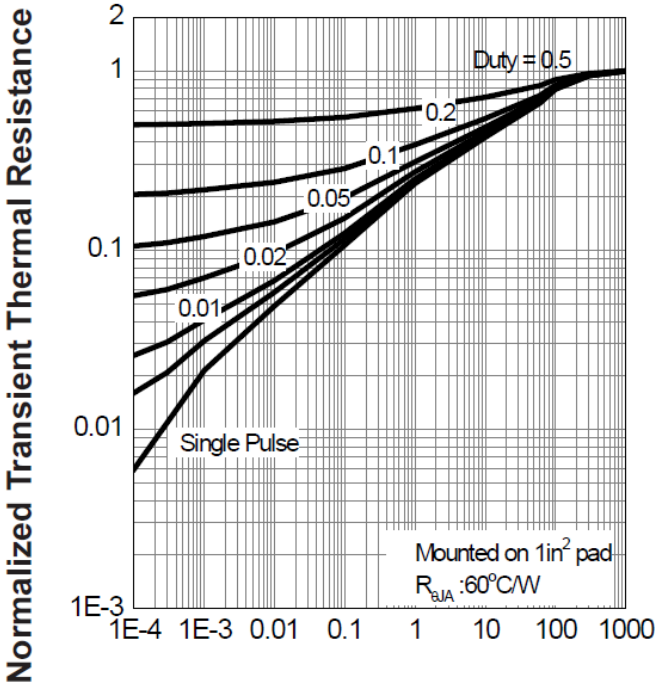


Typical Operating Characteristics(Cont.)

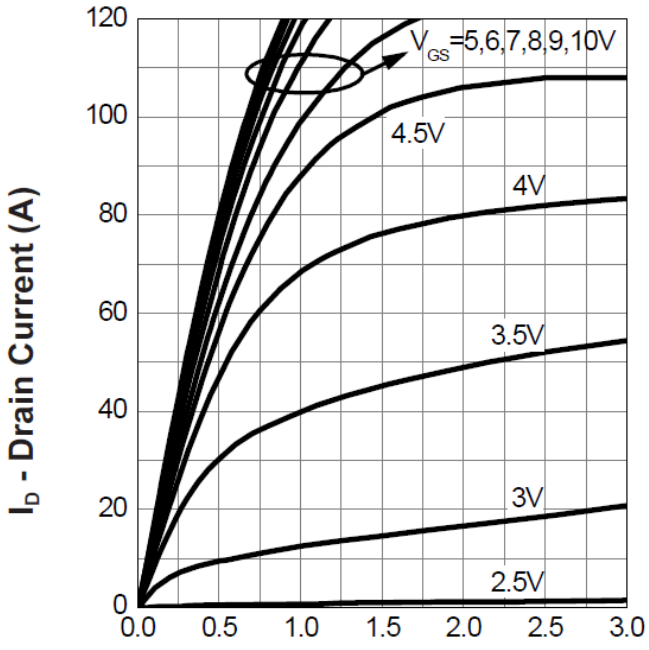
Safe Operation Area



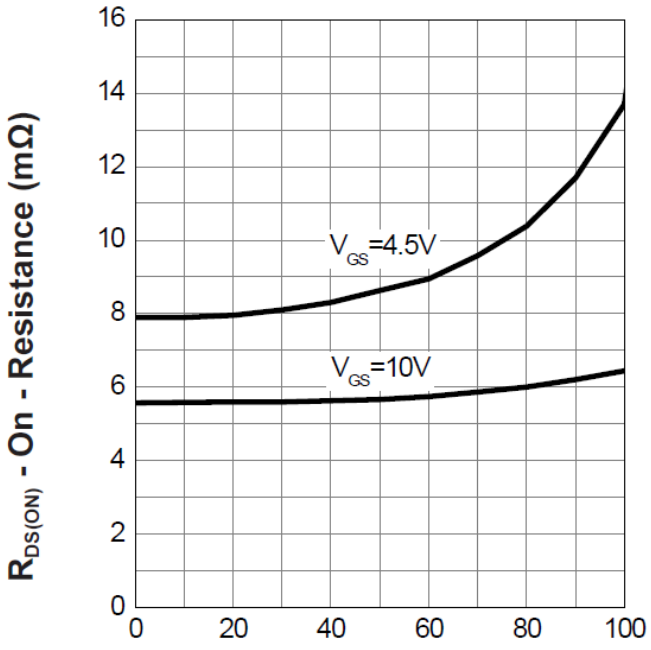
Thermal Transient Impedance



Output Characteristics

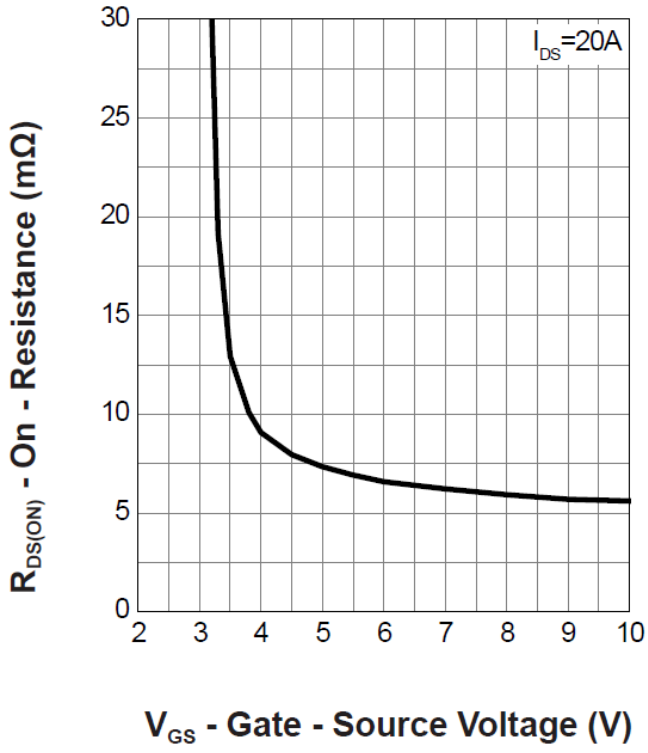


Drain-Source On Resistance

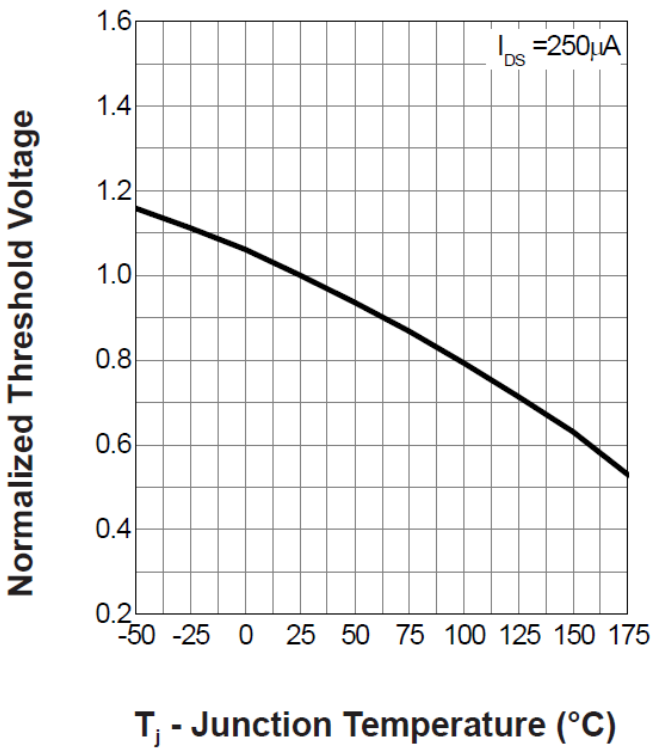


Typical Operating Characteristics (Cont.)

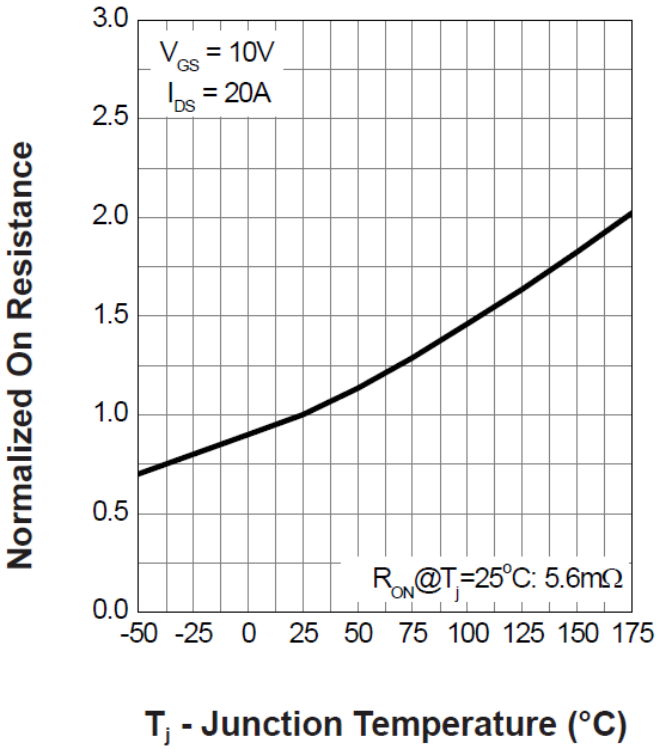
Gate-Source On Resistance



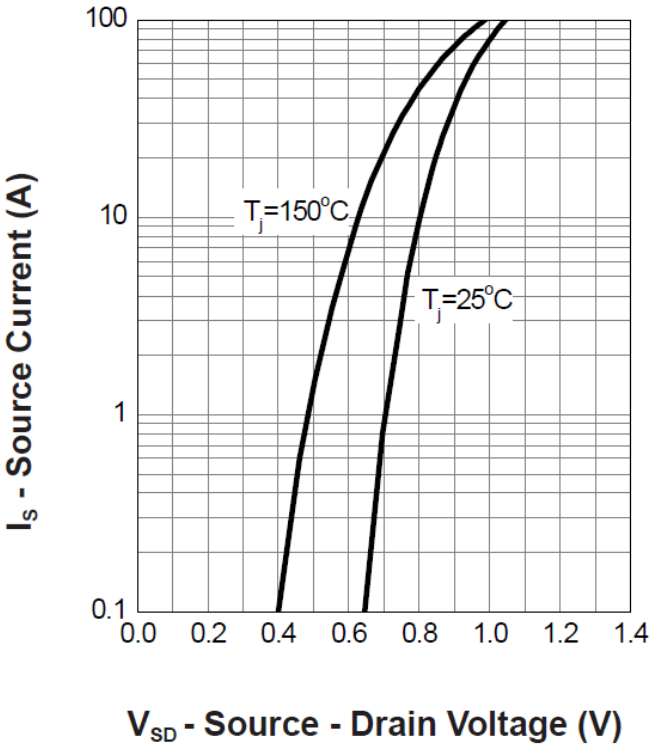
Gate Threshold Voltage



Drain-Source On Resistance

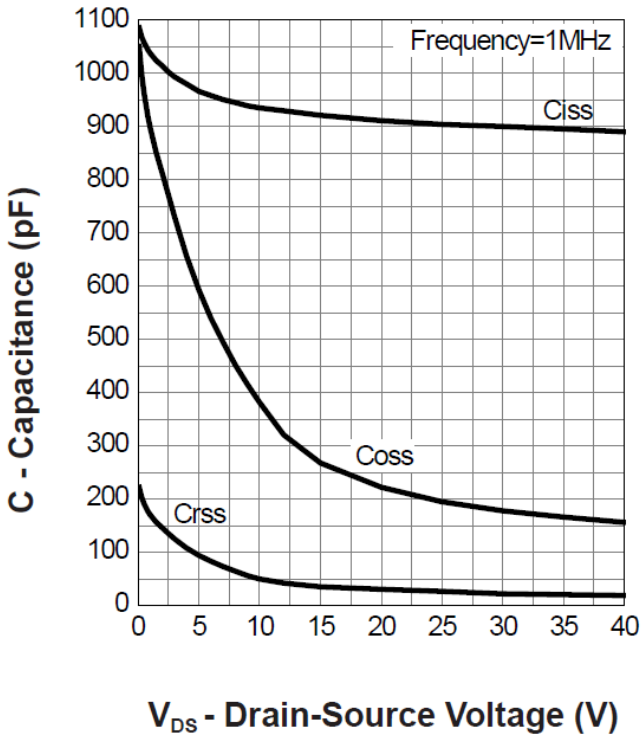


Source-Drain Diode Forward

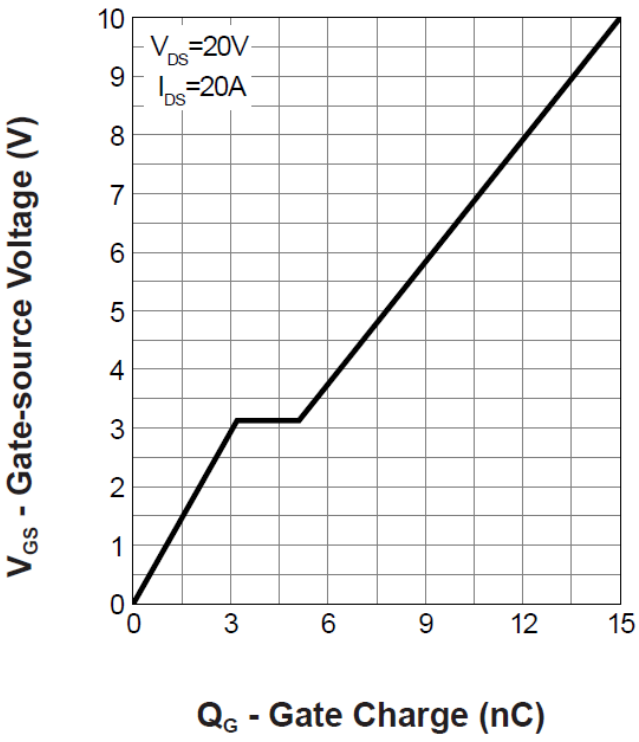


Typical Operating Characteristics (Cont.)

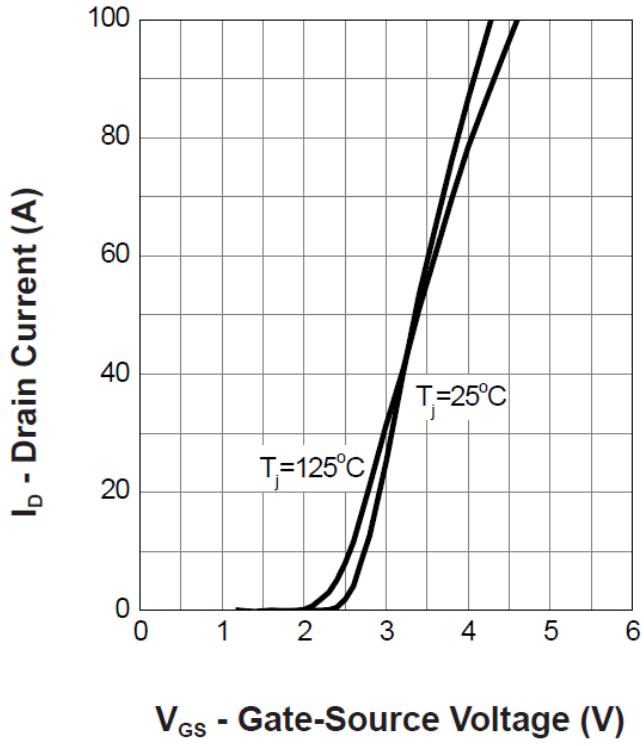
Capacitance



Gate Charge

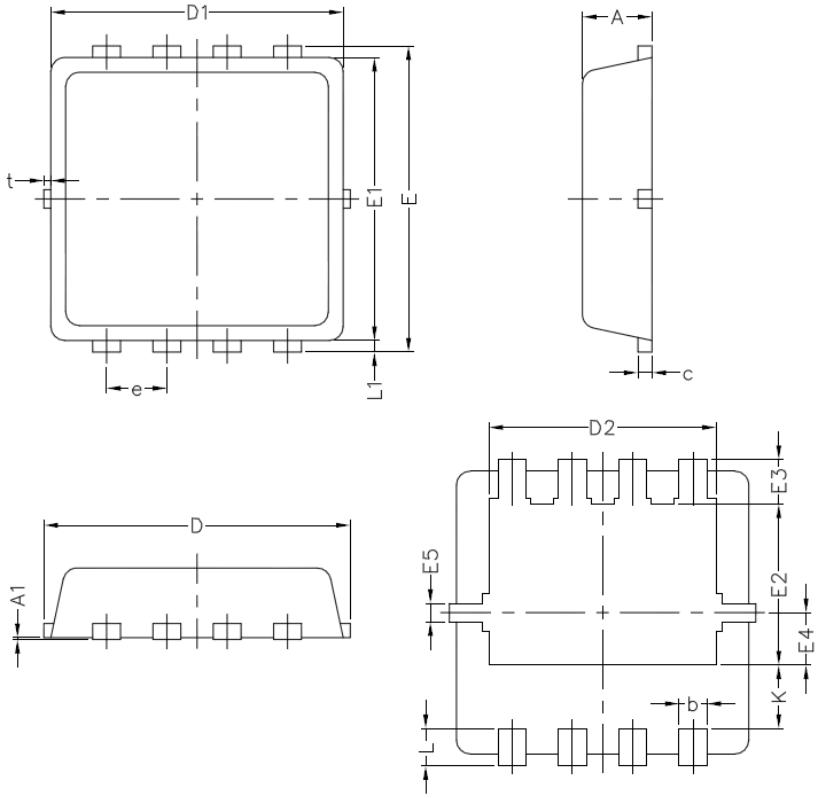


Transfer Characteristics



Package Information

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