

N-Channel Enhancement Mode MOSFET

TDM3578A

DESCRIPTION

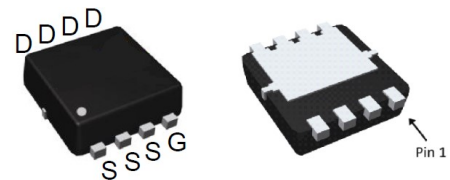
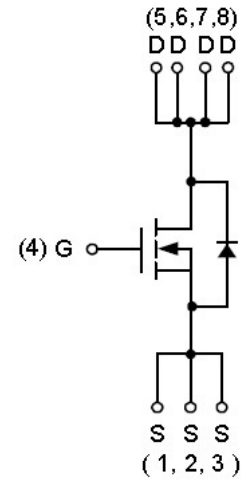
The TDM3578A uses advanced technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- $R_{DS(ON)} < 7.4m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)} < 10.7m\Omega$ @ $V_{GS}=4.5V$
- High Power and current handling capability
- Lead free product is available
- Surface Mount Package

Application

- Power Management in Desktop Computer or DC/DC Converters.



PPAK-3*3-8

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
Drain Current @ Continuous(Note 5)	I_D ($T_C=25^\circ\text{C}$)	48	A
	I_D ($T_C=100^\circ\text{C}$)	29	A
Drain Current @ Current-Pulsed (Note 3)	I_{DM} ($T_C=25^\circ\text{C}$)	192	A
Maximum Power Dissipation(Note 2)	P_D ($T_C=25^\circ\text{C}$)	18	W
Avalanche Current, Single pulse (Note3,6)	$I_{AS}(L=0.5mH)$	17	A
Avalanche Energy, Single pulse (Note3,6)	$E_{AS}(L=0.5mH)$	72	mJ
Thermal Resistance-Junction to Case	$R_{\theta JC}$ (Steady State)	6.4	$^\circ\text{C}/\text{W}$
Thermal Resistance-Junction to Ambient(Note1,4)	$R_{\theta JA}$ (Steady State)	50	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	T_J	-55 To 150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 To 150	$^\circ\text{C}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	μ A
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	1.7	2.5	V
Drain-Source On-State Resistance (Note4)	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	5	7.4	mΩ
		V _{GS} =4.5V, I _D =10A	-	8.6	10.7	mΩ
Gate Resistance	R _g	V _{DS} = V _{GS} =0V, f = 1.0MHz	-	2.2	-	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	790	-	PF
Output Capacitance	C _{oss}		-	556	-	PF
Reverse Transfer Capacitance	C _{rss}		-	45	-	PF
SWITCHING CHARACTERISTICS						
Turn-on Delay Time	t _{d(on)}	V _{DS} =15V, V _{GS} =4.5V, R _G =4.5Ω, I _D =20A	-	7.1	-	nS
Turn-on Rise Time	t _r		-	45.5	-	nS
Turn-Off Delay Time	t _{d(off)}		-	11	-	nS
Turn-Off Fall Time	t _f		-	21	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =20A, V _{GS} =10V	-	24	-	nC
Gate-Source Charge	Q _{gs}		-	6.4	-	nC
Gate-Drain Charge	Q _{gd}		-	2.9	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 4)	V _{SD}	V _{GS} =0V, I _S =20A	-	0.8	1.2	V
Continuous Source Current	I _S		-	-	48	A
Body Diode Reverse Recovery Time	T _{rr}	I _F =20A, dI/dt=100A/μs	-	21	-	nS
Body Diode Reverse Recovery Charge	Q _{rr}		-	18	-	nC

Note 1: The value of $R_{\theta JC}$ is measured in a still air environment with $T_A=25^{\circ}\text{C}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design.

Note 2: The power dissipation P_D is based on $T_{J(MAX)}=150^{\circ}\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

Note 3: Single pulse width limited by junction temperature $T_{J(MAX)}=150^{\circ}\text{C}$.

Note 4: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

Note 5: The maximum current rating is package limited.

Note 6: The EAS data shows Max. rating. The test condition is $V_{DS}=20V$, $V_{GS}=10V$, $L=0.5mH$

Typical Operating Characteristics

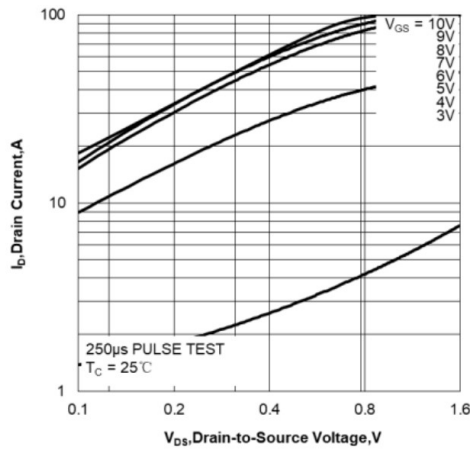


Figure 1. Output Characteristics

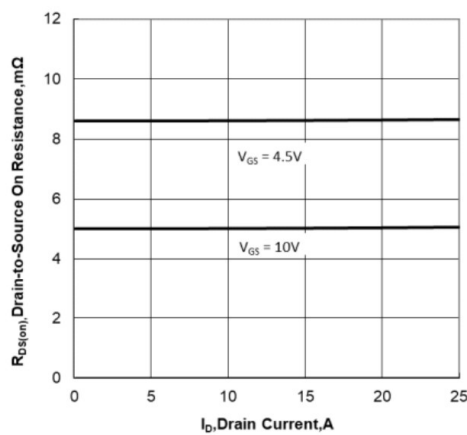
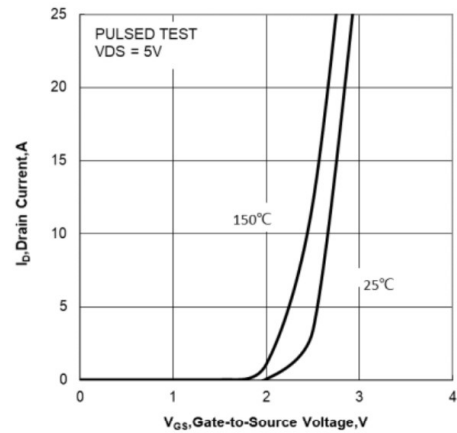
Figure 3. Drain-to-Source On Resistance
vs Drain Current

Figure 2. Transfer Characteristics

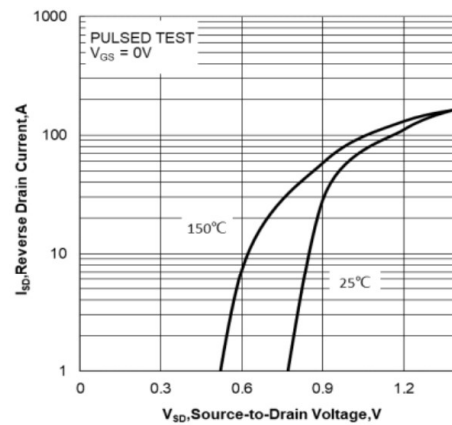
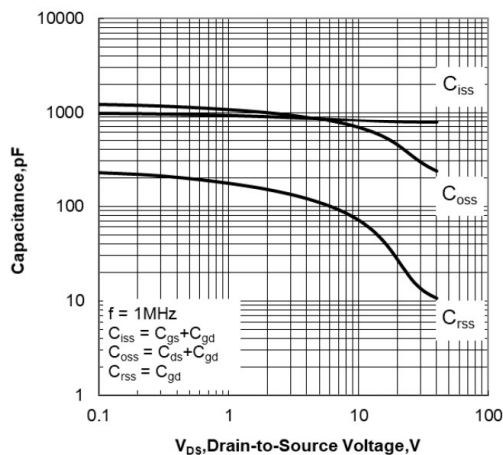
Figure 4. Body Diode Forward Voltage
vs Source Current and Temperature

Figure 5. Capacitance Characteristics

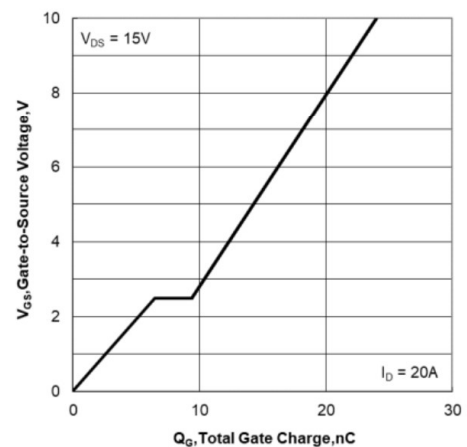


Figure 6. Gate Charge Characteristics

Typical Operating Characteristics(Cont.)

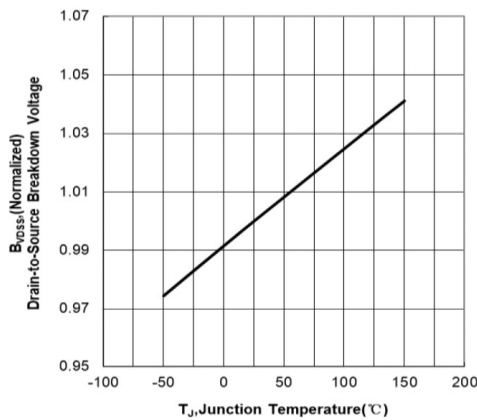


Figure 7. Normalized Breakdown Voltage
vs Junction Temperature

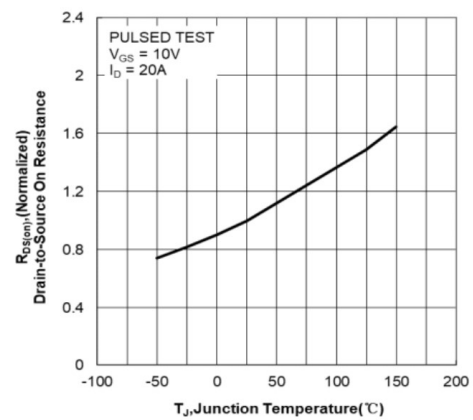


Figure 8. Normalized On Resistance
vs Junction Temperature

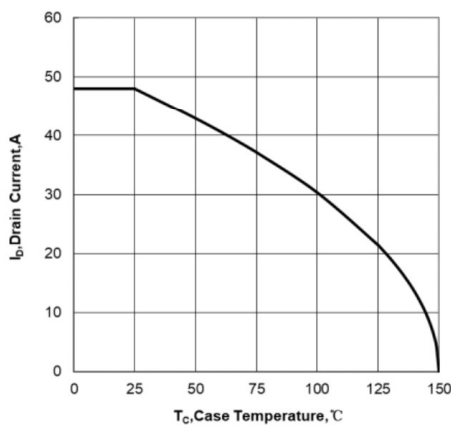


Figure 9. Maximum Continuous Drain Current
vs Case Temperature

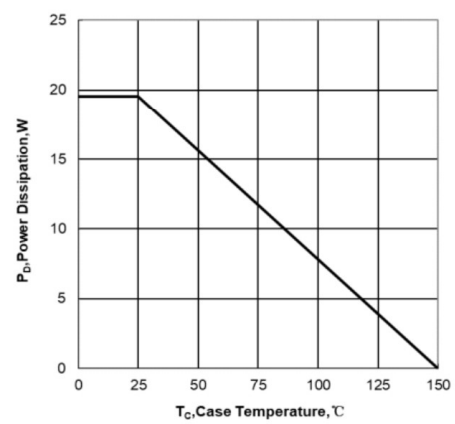


Figure 10. Maximum Power Dissipation
vs Case Temperature

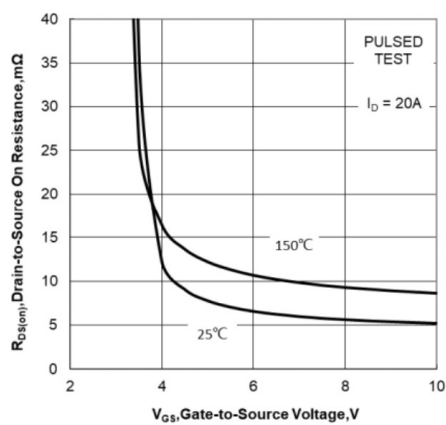


Figure 11. Drain-to-Source On Resistance
vs Gate Voltage and Drain Current

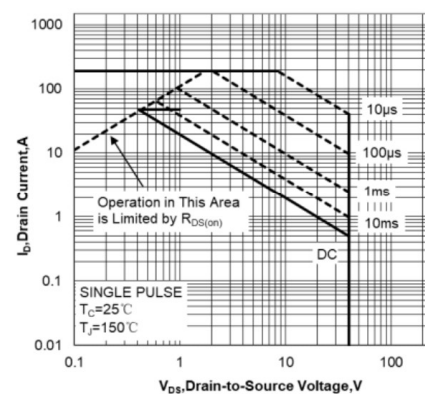


Figure 12. Maximum Safe Operating Area

Typical Operating Characteristics (Cont.)

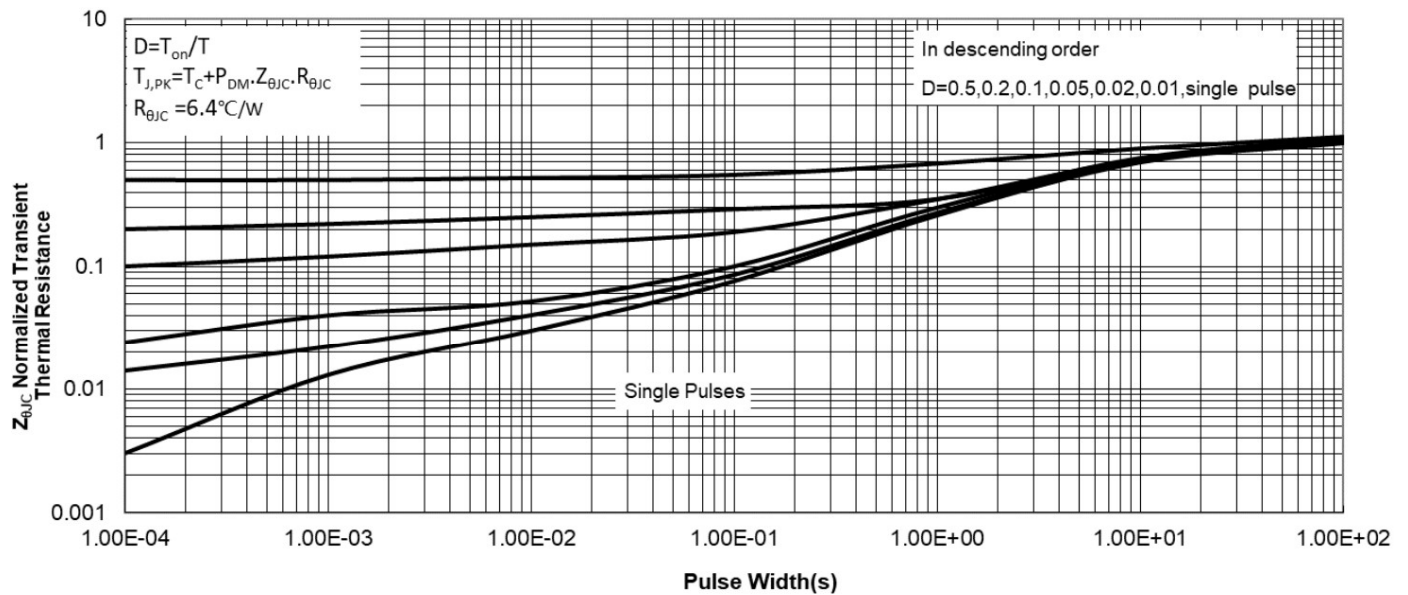


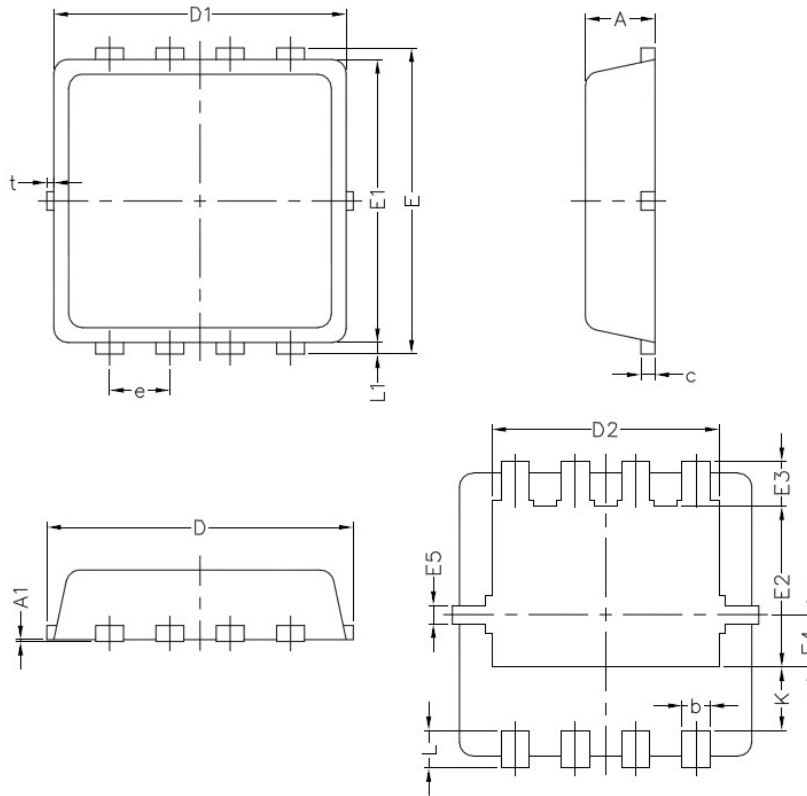
Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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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