

N-Channel Enhancement Mode MOSFET

TDM2378A

DESCRIPTION

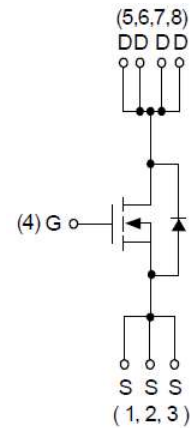
The TDM2378A uses advanced technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

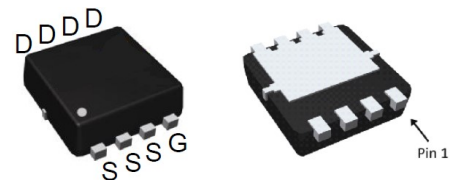
- $R_{DS(ON)} < 8.1m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)} < 10.8m\Omega$ @ $V_{GS}=4.5V$
- High Power and current handling capability
- Surface Mount Package
- Lead Free and Green Devices available (RoHS Compliant)

Application

- DC-DC Power Converter
- Uninterruptible power supply
- Synchronous Rectification



N-Channel MOSFET



PPAK-3*3-8

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current @ Continuous	I_D ($T_c=25^\circ\text{C}$)	32	A
	I_D ($T_c=100^\circ\text{C}$)	20	A
Drain Current @ Current-Pulsed (Note 1)	I_{DM} ($T_c=25^\circ\text{C}$)	128	A
Power Dissipation	$P_D(T_c=25^\circ\text{C})$	15	W
Single pulsed avalanche energy (Note 2)	E_{AS}	144	mJ
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	8.6	$^\circ\text{C}/\text{W}$
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 ($T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
STATIC CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	30	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =30V, V _{GS} =0V	-	-	1	μ A
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	5.7	8.1	mΩ
	(Note 3)	V _{GS} =4.5V, I _D =10A	-	9	10.8	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =20A	-	27.8	-	S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=100KHz	-	1197	-	PF
Output Capacitance	C _{oss}		-	127	-	PF
Reverse Transfer Capacitance	C _{rss}		-	109	-	PF
Turn-on Delay Time	t _{d(on)}	V _{DS} =15V, V _{GS} =4.5V, R _G =3Ω R _L =0.75Ω	-	9.1	-	nS
Turn-on Rise Time	t _r		-	6.4	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30.4	-	nS
Turn-Off Fall Time	t _f		-	9.8	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =20A, V _{GS} =10V	-	21.3	-	nC
Gate-Source Charge	Q _{gs}		-	3.8	-	nC
Gate-Drain Charge	Q _{gd}		-	3.7	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =10A	-	-	1.2	V
Body Diode Reverse Recovery Time	T _{rr}	I _F =20A, dI/dt=500A/μs	-	8.5	-	nS
Body Diode Reverse Recovery Charge	Q _{rr}		-	3.2	-	nC

NOTES:

1. Repetitive rating; pulse width limited by max. junction temperature.
2. EAS condition: $V_{DS}=24V, V_{GS}=10V, L=0.5mH$, starting $T_J=25^\circ\text{C}$.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$.

Typical Operating Characteristics

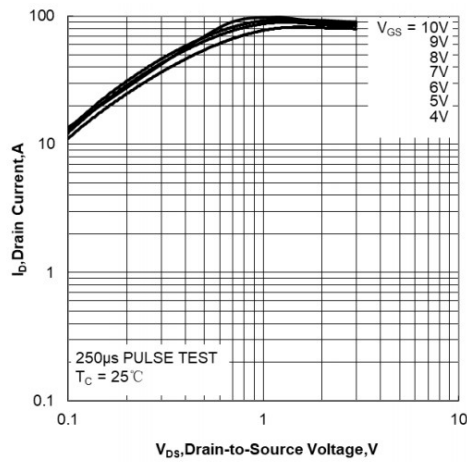


Figure 1. Output Characteristics

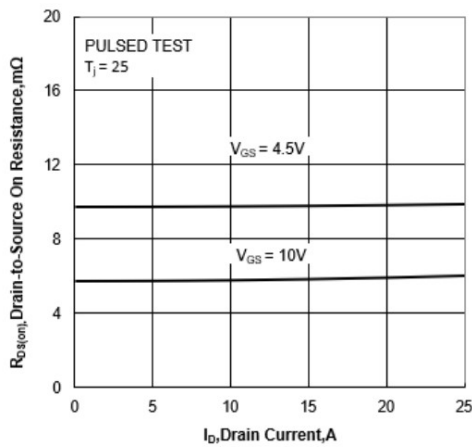
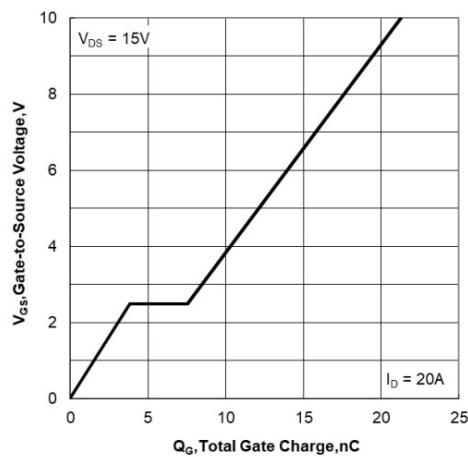
Figure 3. Drain-to-Source On Resistance
vs Drain Current

Figure 5. Gate Charge Characteristics

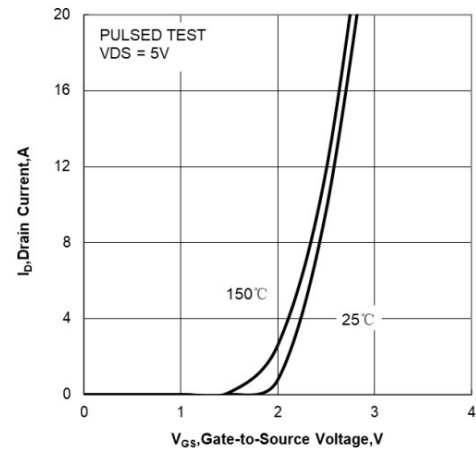


Figure 2. Transfer Characteristics

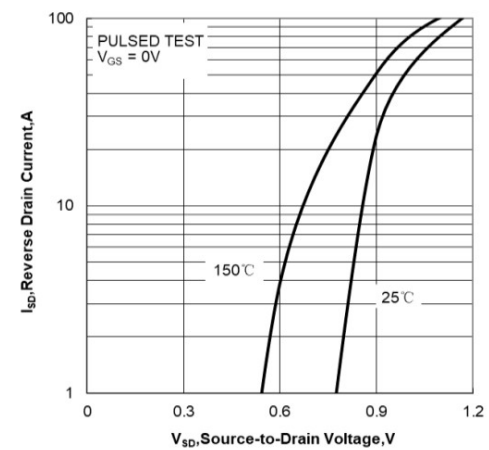
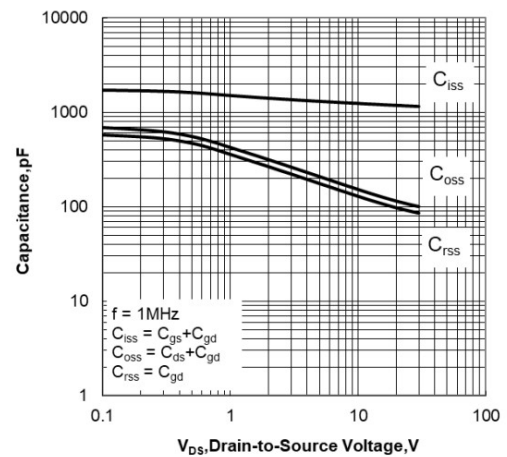
Figure 4. Body Diode Forward Voltage
vs Source Current and Temperature

Figure 6. Capacitance Characteristic

Typical Operating Characteristics (Cont.)

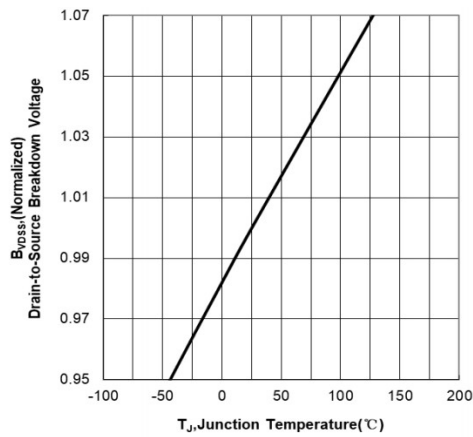


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

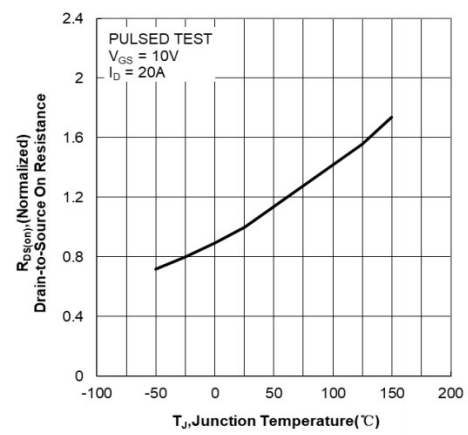


Figure 8. Normalized On Resistance vs Junction Temperature

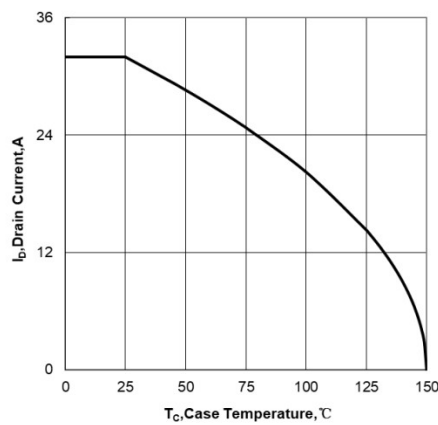


Figure 9. Maximum Continuous Drain Current vs Case Temperature

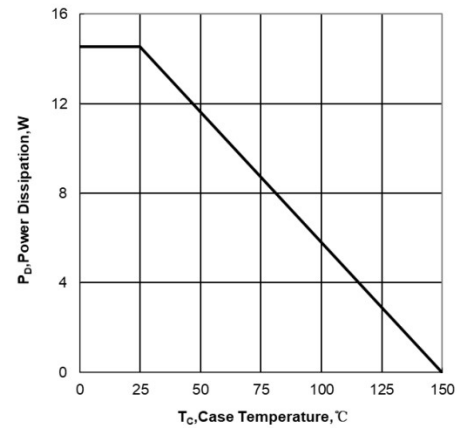


Figure 10. Maximum Power Dissipation vs Case Temperature

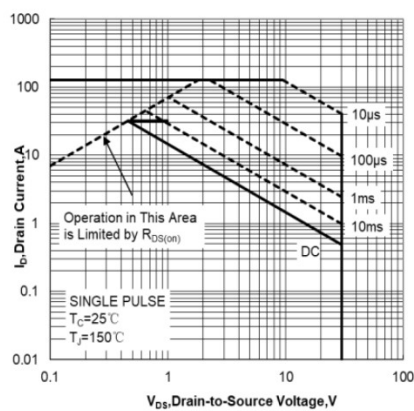


Figure 11. Maximum Safe Operating Area

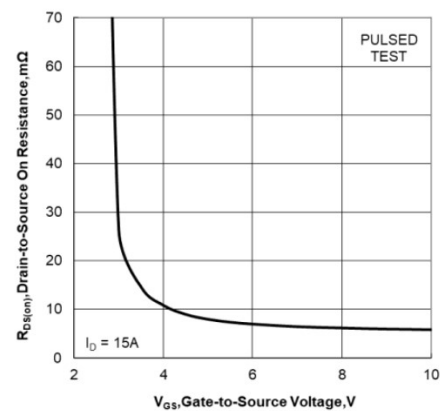


Figure 12. Drain-to-Source On Resistance vs Gate Voltage and Drain Current

Typical Operating Characteristics (Cont.)

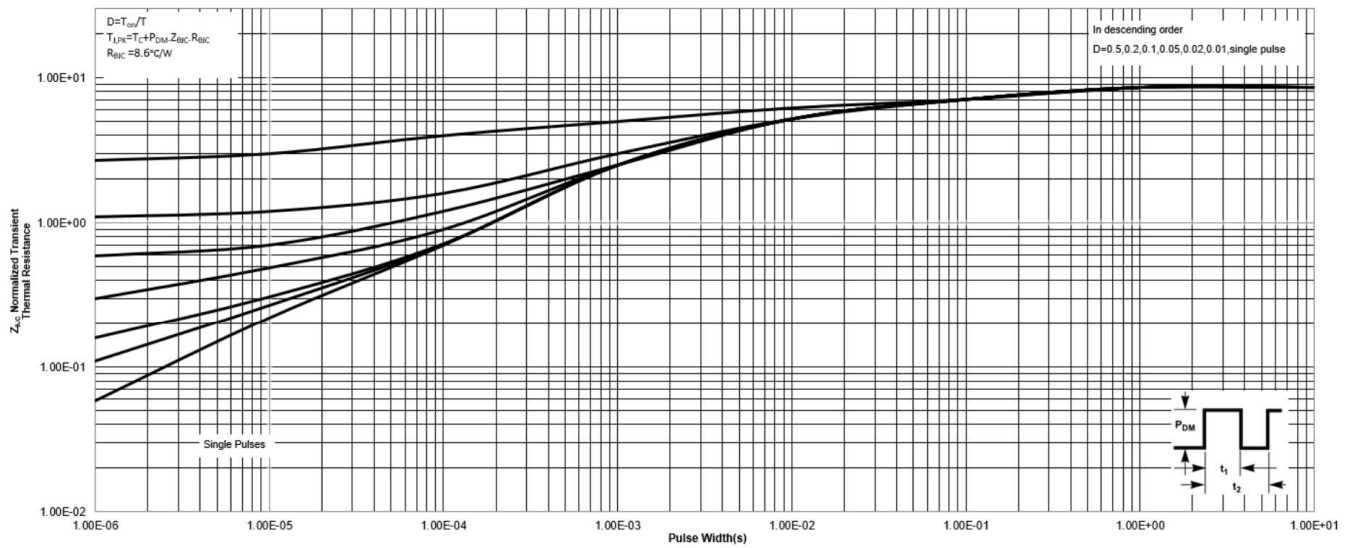


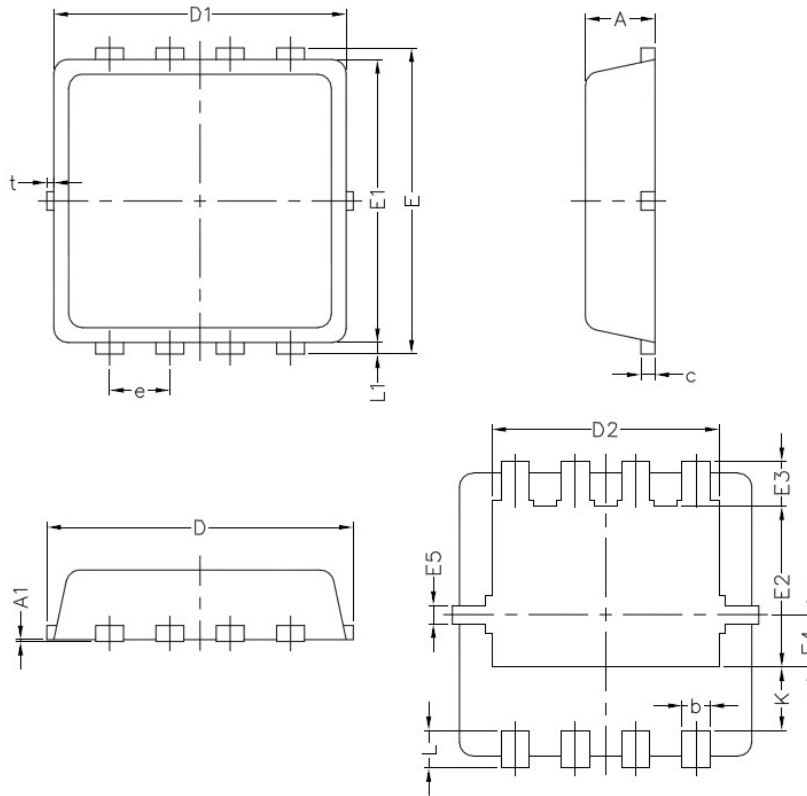
Figure 13. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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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