

N-Channel Enhancement Mode MOSFET

TDM2356

DESCRIPTION

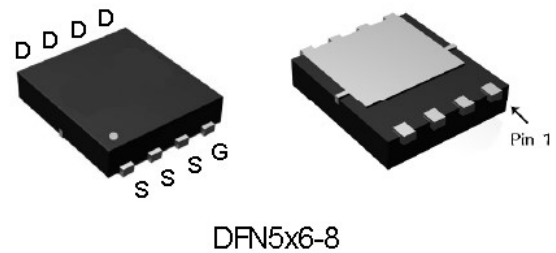
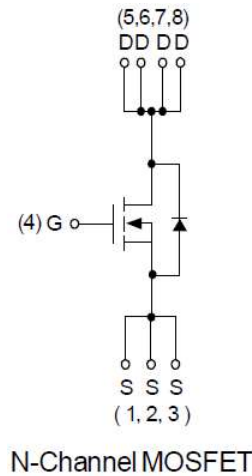
The TDM2356 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- $R_{DS(ON)} < 7.2\text{m}\Omega$ @ $V_{GS}=10\text{V}$
 $R_{DS(ON)} < 12\text{m}\Omega$ @ $V_{GS}=4.5\text{V}$
- High Power and current handling capability
- Surface Mount Package
- Lead Free and Green Devices available (RoHS Compliant)

Application

- Battery protection
- Uninterruptible power supply
- General purpose applications

ABSOLUTE MAXIMUM RATINGS($T_A=25^\circ\text{C}$ 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 ($T_C=25^\circ\text{C}$)	60	A
	I_D ($T_C=100^\circ\text{C}$)	42	A
Drain Current @ Current-Pulsed (Note 1)	I_{DM} ($T_C=25^\circ\text{C}$)	110	A
Power Dissipation	$P_D(T_C=25^\circ\text{C})$	55	W
Single pulsed avalanche energy (Note 2)	E_{AS}	120	mJ
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.2	$^\circ\text{C}/\text{W}$
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	-	5.8	7.2	mΩ
	(Note 3)	V _{GS} =4.5V, I _D =20A	-	7.9	12	
Forward Transconductance	g _{FS}	V _{DS} =15V, I _D =20A	20	-	-	S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=100KHz	-	1177	-	PF
Output Capacitance	C _{oss}		-	177	-	PF
Reverse Transfer Capacitance	C _{rss}		-	131	-	PF
Turn-on Delay Time	t _{d(on)}	V _{DS} =15V, V _{GS} =10V, R _G =2.5Ω I _D =20A	-	14	-	nS
Turn-on Rise Time	t _r		-	12	-	nS
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS
Turn-Off Fall Time	t _f		-	10	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =1A, V _{GS} =10V	-	23.1	-	nC
Gate-Source Charge	Q _{gs}		-	3.2	-	nC
Gate-Drain Charge	Q _{gd}		-	3.6	-	nC
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	-	1.2	V
Body Diode Reverse Recovery Time	T _{rr}	I _F =20A, dI/dt=100A/μs	-	24	-	nS
Body Diode Reverse Recovery Charge	Q _{rr}		-	52	-	nC

NOTES:

1. Repetitive rating; pulse width limited by max. junction temperature.
2. EAS condition: $V_{DD}=30V$, $V_{GS}=10V$, $L=0.5mH$, 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. Typ. Output Characteristics

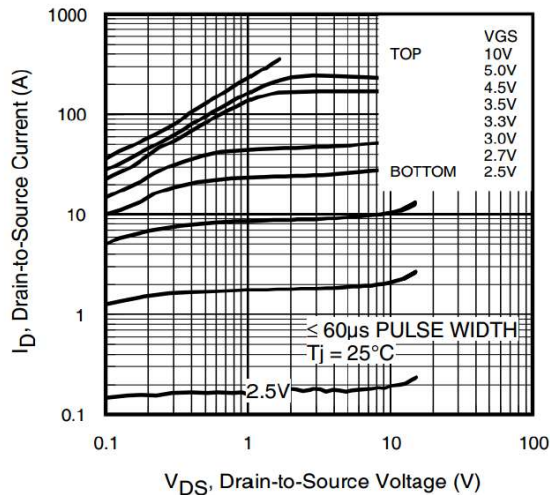


Figure 2. Transfer Characteristics (Junction Temperature)

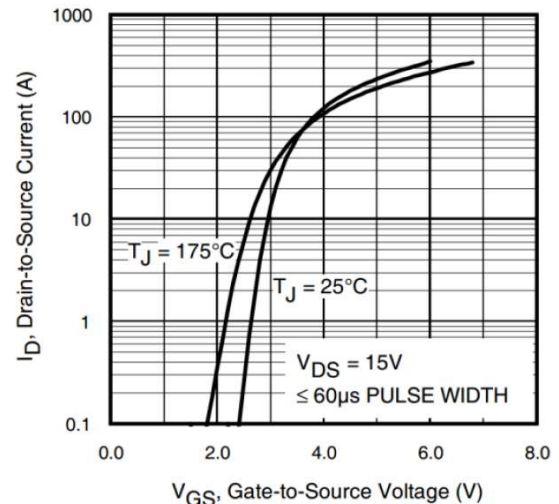


Figure 3. On-Resistance vs. Drain Current and Gate Voltage Figure

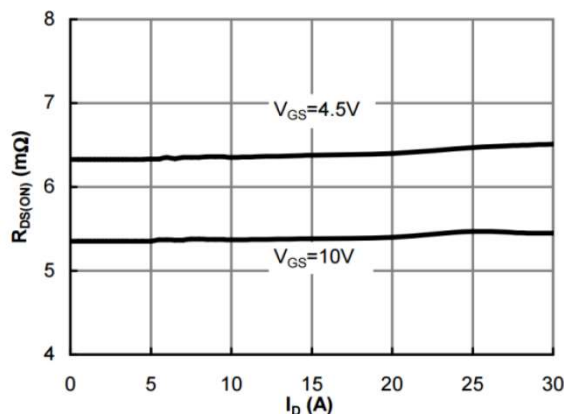


Figure 4. On-Resistance vs. Junction Temperature

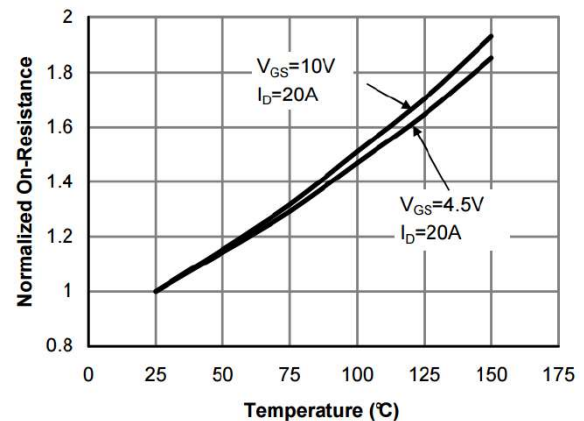


Figure 5. On-Resistance vs. Gate-Source Voltage (Junction Temperature)

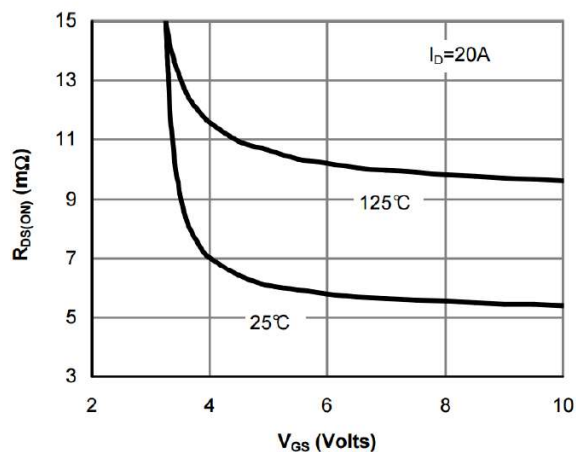
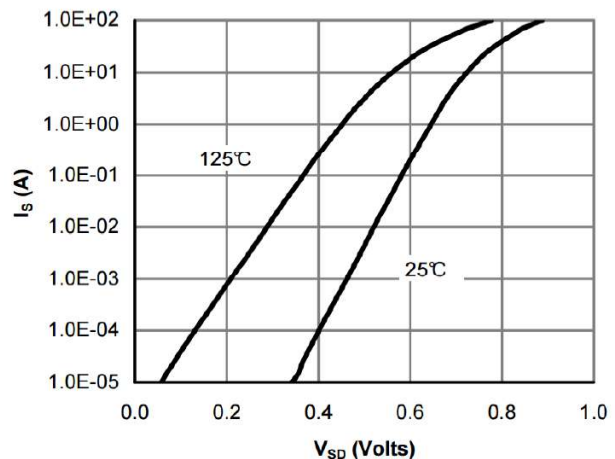


Figure 6. Body-Diode Characteristics (Junction Temperature)



Typical Operating Characteristics (Cont.)

Figure 7. Gate-Charge Characteristics

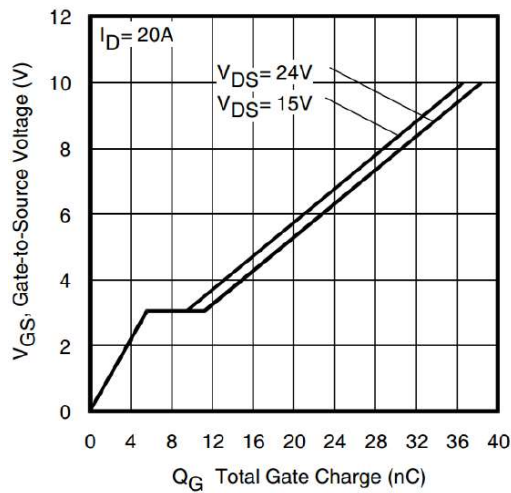


Figure 8. Capacitance Characteristics

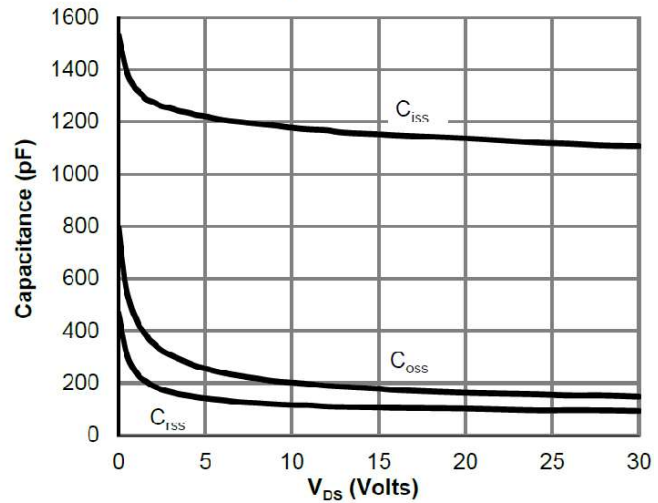
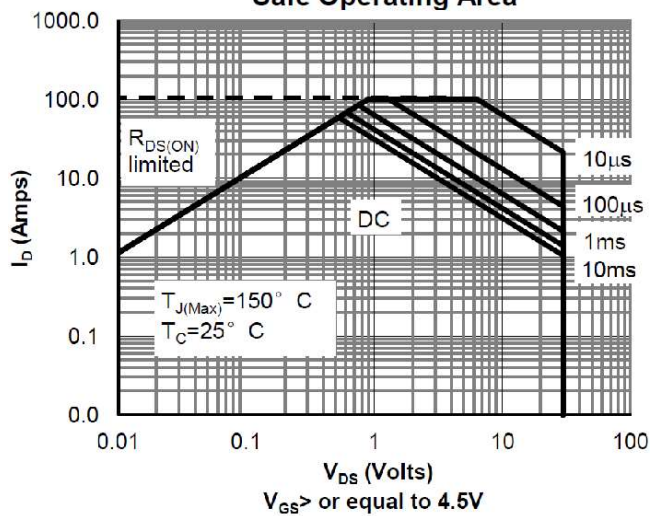
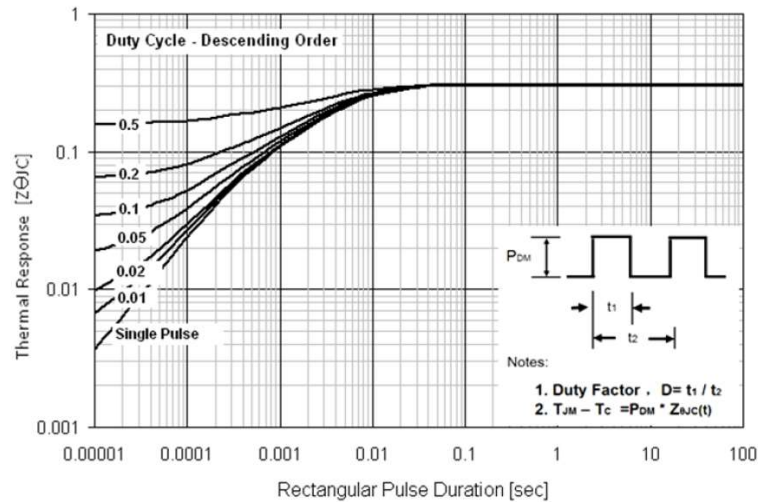
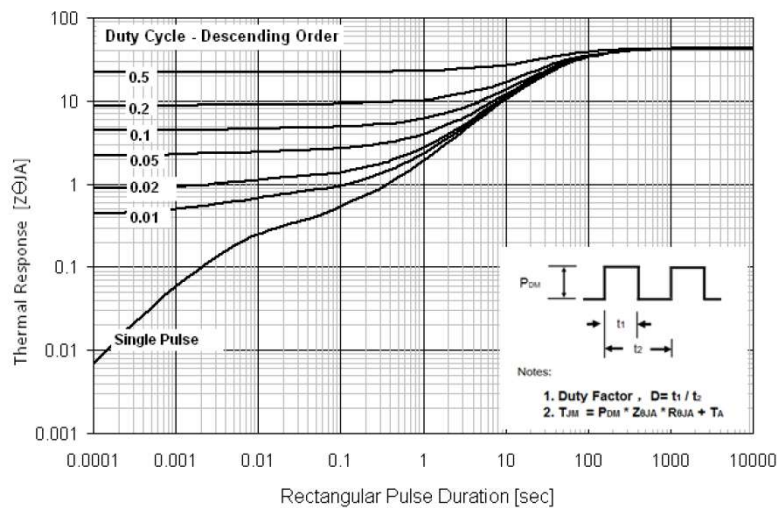


Figure 9: Maximum Forward Biased Safe Operating Area



Typical Operating Characteristics (Cont.)

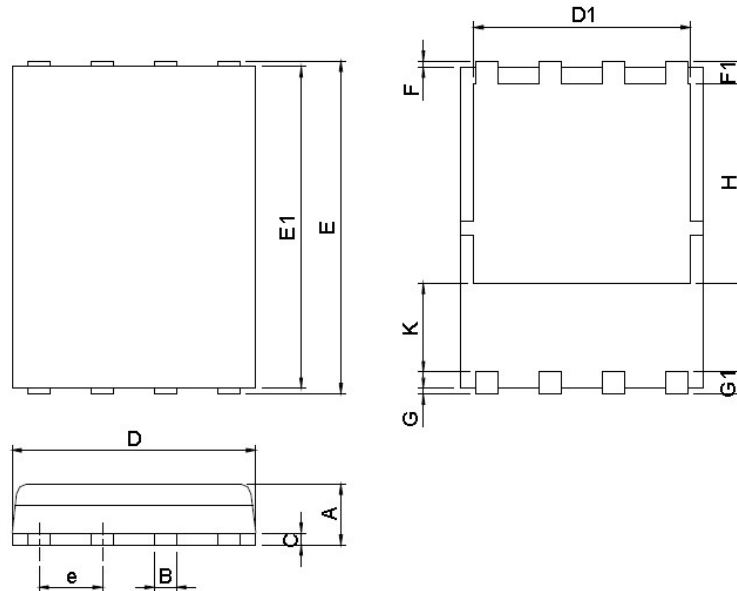
Figure10: Normalized Maximum Transient Thermal Impedance (R_{thJC})Figure 11: Normalized Maximum Transient Thermal Impedance (R_{thJA})

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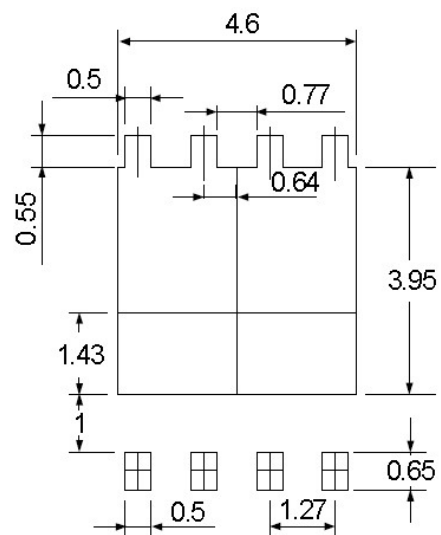
Package Information

DFN5*6-8 Package



DIMENSIONS	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	-

RECOMMENDED LAND PATTERN



UNIT: mm

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.
Mold flash or protrusions shall not exceed 10 mil.

Design Notes