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# Product Specification

DMT36M1LPS-13

N-Channel Enhancement Mode MOSFET

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## Descriptions

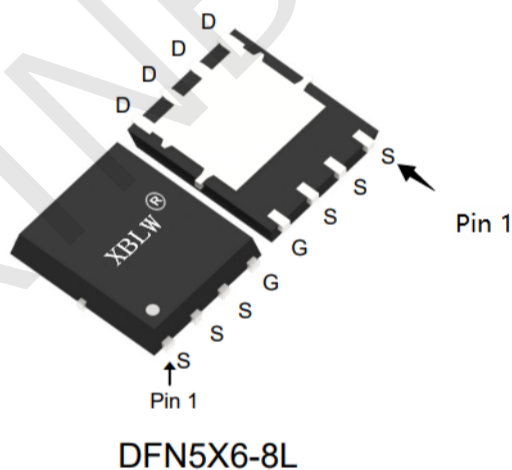
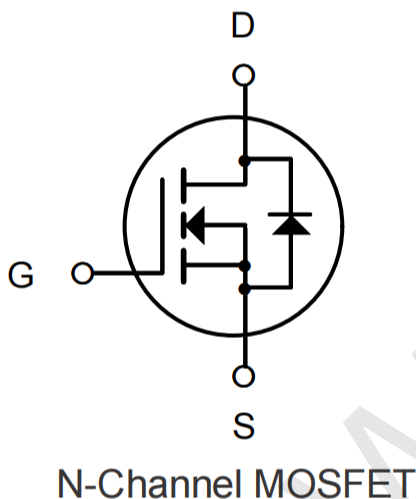
The DMT36M1LPS-13 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## Features

- $V_{DS} = 30V, I_D = 90A$
- $R_{DS(ON)} < 2.4m\Omega$   $V_{GS} = 10V$

## Applications

- Battery protection
- Load switch
- Uninterruptible power supply



## Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
DMT36M1LPS-13	DFN5X6-8L	T36M1LPS	Tape	5000Pcs/Reel

**Absolute Maximum Ratings (T<sub>c</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>c</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	90	A
I <sub>D</sub> @T <sub>c</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	65	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	160	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	180	mJ
I <sub>AS</sub>	Avalanche Current	60	A
P <sub>D</sub> @T <sub>c</sub> =25°C	Total Power Dissipation <sup>4</sup>	187	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	1.1	°C/W

### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =250uA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =1mA	---	0.014	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V , I <sub>D</sub> =30A	---	2	2.4	mΩ
		V <sub>GS</sub> =4.5V , I <sub>D</sub> =15A	---	2.5	3.2	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	---	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-4	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =24V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V , I <sub>D</sub> =30A	---	50	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V , V <sub>GS</sub> =0V , f=1MHz	---	1.7	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> = 15V , V <sub>GS</sub> = 10V , I <sub>D</sub> = 15A	---	56.9	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	13.8	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	23.5	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 15V , V <sub>GS</sub> =10V , R <sub>G</sub> =3.3Ω , I <sub>D</sub> =1A	---	20.1	---	ns
T <sub>r</sub>	Rise Time		---	6.3	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	124.6	---	
T <sub>f</sub>	Fall Time		---	15.8	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V , V <sub>GS</sub> =0V , f=1MHz	---	4345	---	pF
C <sub>oss</sub>	Output Capacitance		---	340	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	225	---	

### Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	90	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =1A , T <sub>J</sub> =25°C	---	---	1.2	V

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
- The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=60A.
- The power dissipation is limited by 150°C junction temperature.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.
- Package limitation current is 85A.

**Typical Characteristics**

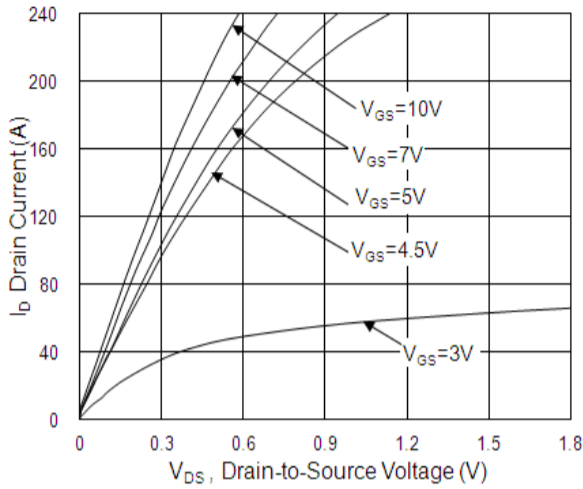


Fig 1. Typical Output Characteristics

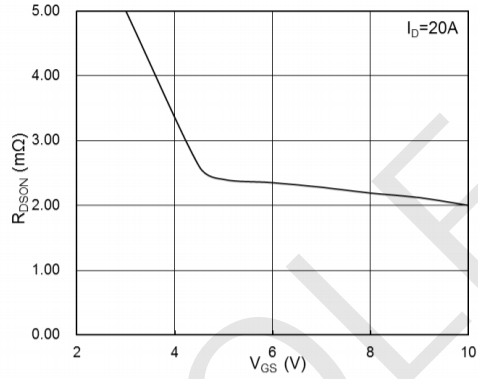


Fig 2. On-Resistance v.s Gate-Source

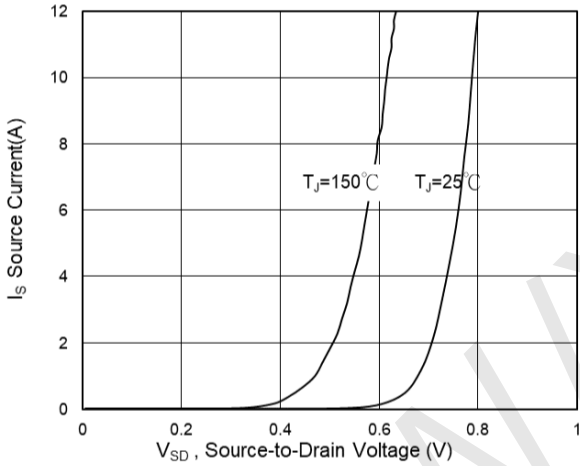


Fig 3. Forward Characteristics of Reverse

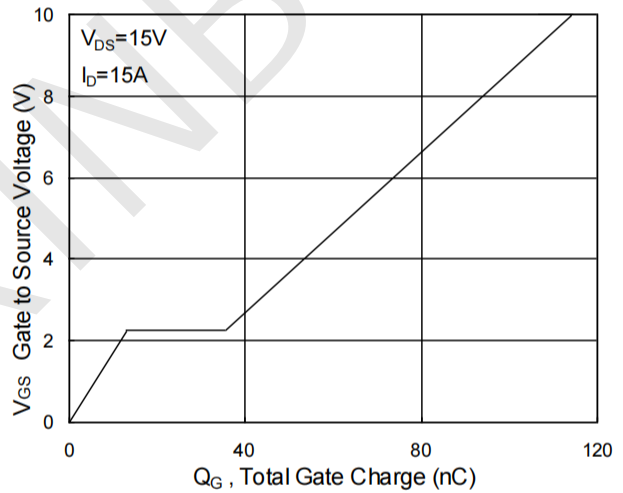


Fig 4. Gate-Charge Characteristics

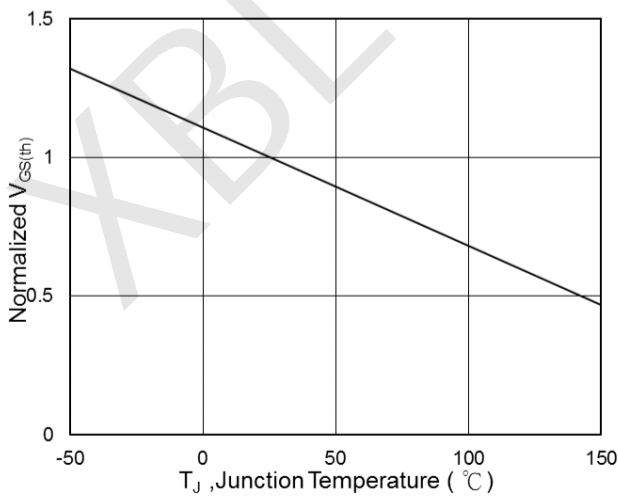


Fig 5. Normalized V<sub>GS(th)</sub> vs. T<sub>J</sub>

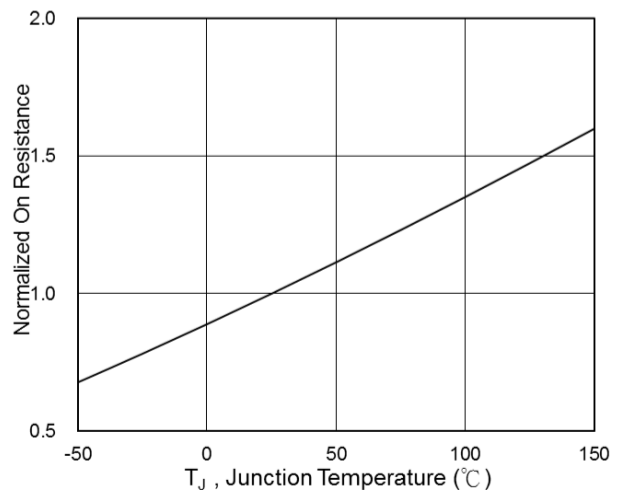


Fig 6. Normalized R<sub>DS(on)</sub> Vs. T<sub>J</sub>

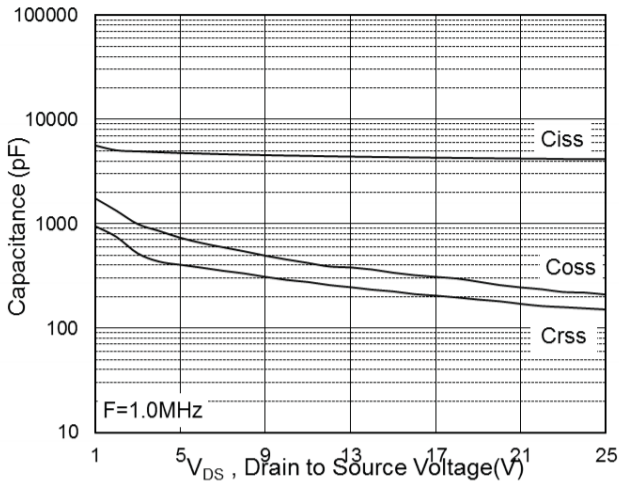


Fig 7. Capacitance

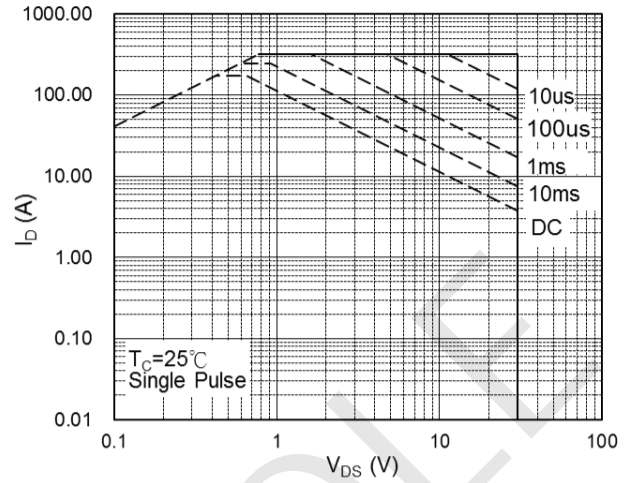


Fig 8. Safe Operating Area

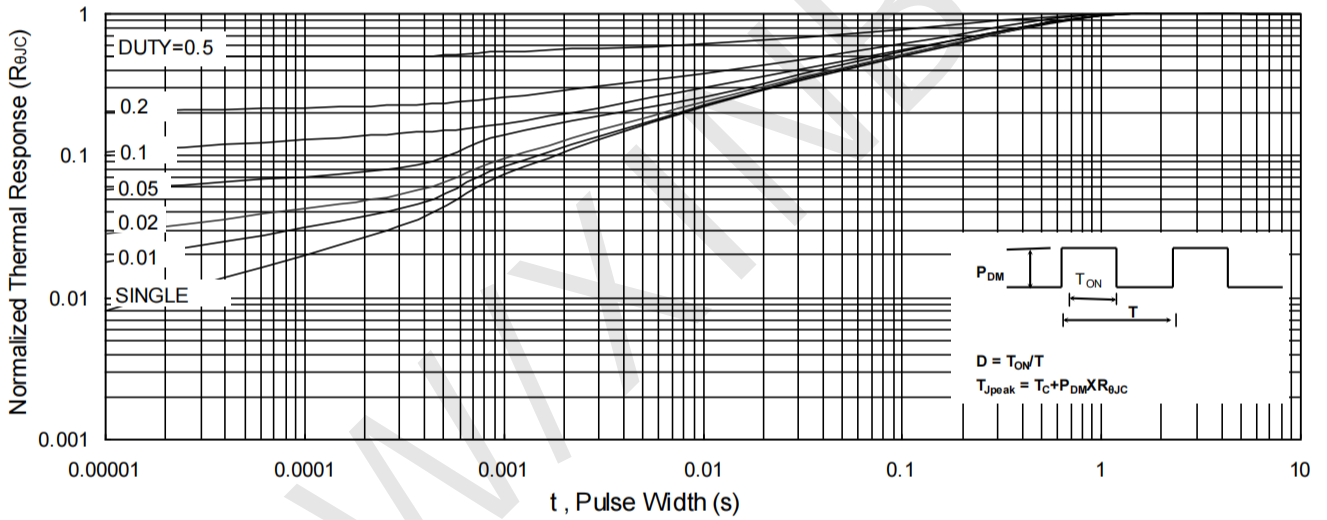


Fig 9. Normalized Maximum Transient Thermal Impedance

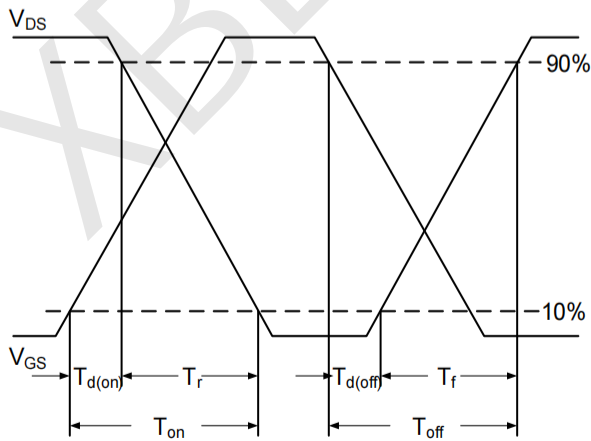


Fig 10. Switching Time Waveform

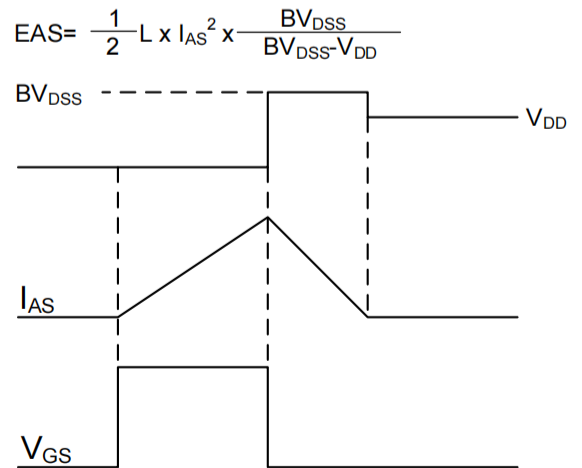
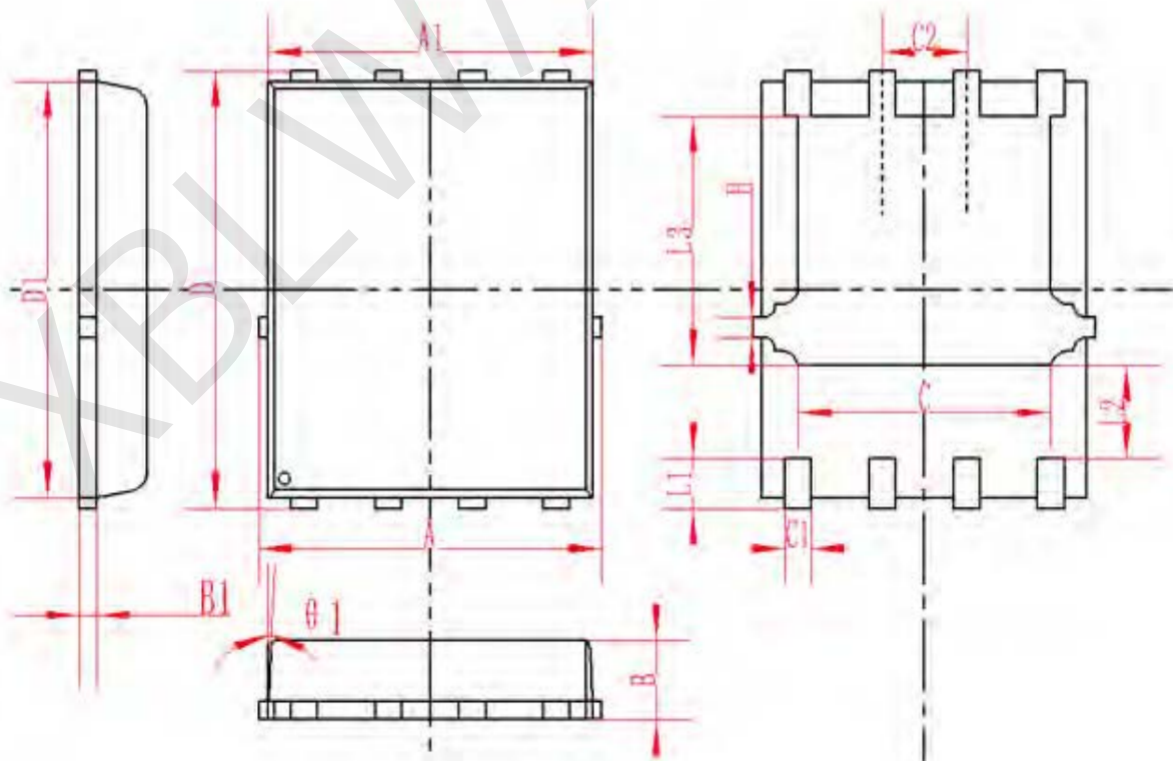


Fig 11. Unclamped Inductive Switching Waveform

## Package Information

### DFN5X6-8L

SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.95	5	5.05	0.195	0.197	0.199
A1	4.82	4.9	4.98	0.190	0.193	0.196
D	5.98	6	6.02	0.235	0.236	0.237
D1	5.67	5.75	5.83	0.223	0.226	0.230
B	0.9	0.95	1	0.035	0.037	0.039
B1	0.254REF			0.010REF		
C	3.95	4	4.05	0.156	0.157	0.159
C1	0.35	0.4	0.45	0.014	0.016	0.018
C2	1.27TYP			0.5TYP		
$\theta 1$	8°	10°	12°	8°	10°	12°
L1	0.63	0.64	0.65	0.025	0.025	0.026
L2	1.2	1.3	1.4	0.047	0.051	0.055
L3	3.415	3.42	3.425	0.134	0.135	0.135
H	0.24	0.25	0.26	0.009	0.010	0.010



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