



Description

The SM480T9RL 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.



TO-252-2L

General Features

$V_{DS} = 30V$ $I_D = 20A$

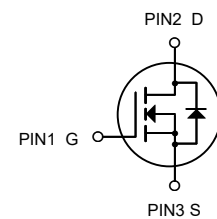
$R_{DS(ON)} < 25m\Omega @ V_{GS} = 10V$

Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SM480T9RL	TO-252-2L	HXY MOSFET	2500

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	20	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	15	A
I_{DM}	Pulsed Drain Current ²	50	A
EAS	Single Pulse Avalanche Energy ³	8.1	mJ
I_{AS}	Avalanche Current	12.7	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ⁴	20.8	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	6	$^\circ C/W$



Electrical Characteristics (T_C=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	30	---	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.023	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =10A	---	18	25	mΩ
		V _{GS} =4.5V , I _D =8A	---	25	38	
V _{GS(th)}	Gate Threshold Voltage		1.0	1.2	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient	V _{GS} =V _{DS} , I _D =250uA	---	-4.2	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =24V , V _{GS} =0V , T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V , I _D =10A	---	5.5	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	2.3	---	Ω
Q _g	Total Gate Charge (4.5V)		---	4.9	---	nC
Q _{gs}	Gate-Source Charge	V _{DS} =15V , V _{GS} =4.5V , I _D =10A	---	1.66	---	
Q _{gd}	Gate-Drain Charge		---	1.85	---	
T _{d(on)}	Turn-On Delay Time		---	1.6	---	ns
T _r	Rise Time	V _{DD} =15V , V _{GS} =10V , R _G =3.3	---	15.8	---	
T _{d(off)}	Turn-Off Delay Time	I _D =10A	---	13	---	
T _f	Fall Time		---	4.8	---	
C _{iss}	Input Capacitance		---	416	---	pF
C _{oss}	Output Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz	---	62	---	
C _{riss}	Reverse Transfer Capacitance		---	51	---	
I _S	Continuous Source Current ^{1,5}		---	---	24	A
I _{SM}	Pulsed Source Current ^{2,5}	V _G =V _D =0V , Force Current	---	---	50	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =10A , di/dt=100A/μs , T _J =25°C	---	8.7	---	nS
Q _{rr}	Reverse Recovery Charge		---	1.95	---	nC

Note :

1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2The data tested by pulsed , pulse width .The EAS data shows Max. rating .

3he test condition is V_{GS} ≤ 300us , duty cycle $\frac{t_{ON}}{t_{ON}+t_{OFF}} \leq 2\%$, V_{GS} =10V, L=0.1mH, I_{AS}=12.7A

4.The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.



Typical Characteristics

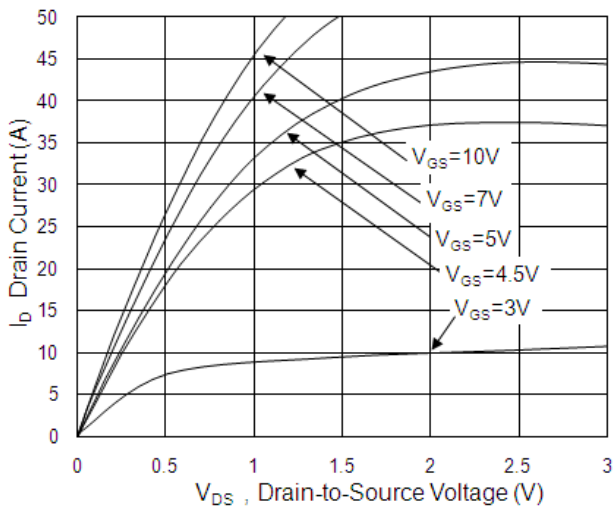


Fig.1 Typical Output Characteristics

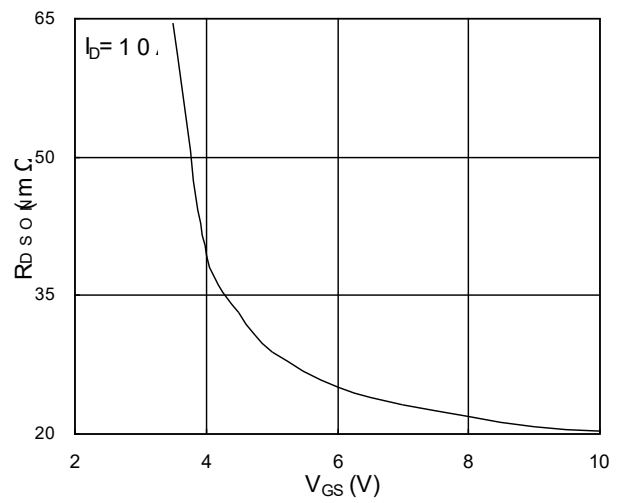


Fig.2 On-Resistance vs. Gate-Source

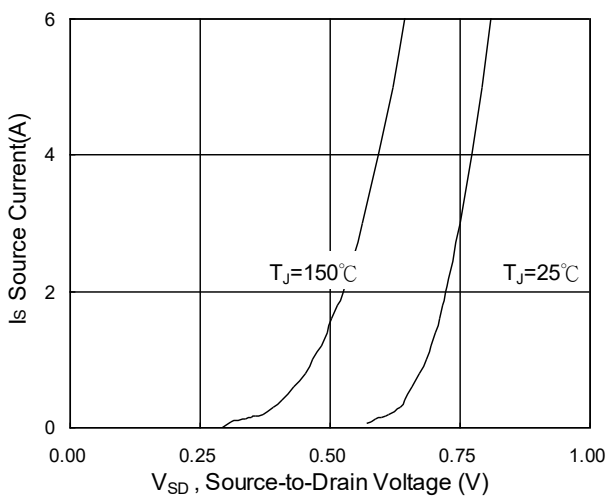


Fig.3 Forward Characteristics Of Reverse

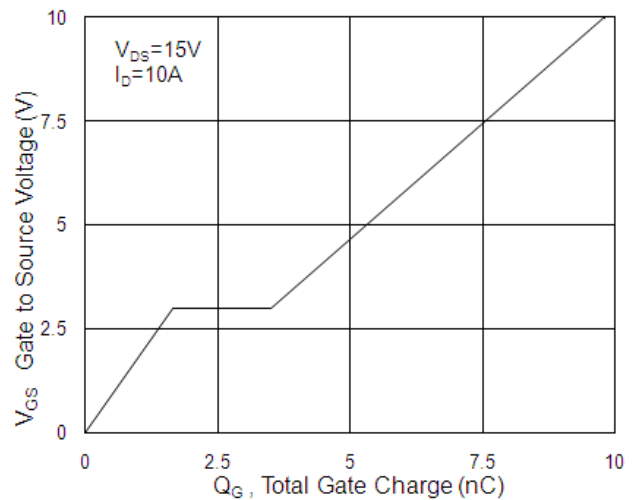


Fig.4 Gate-Charge Characteristics

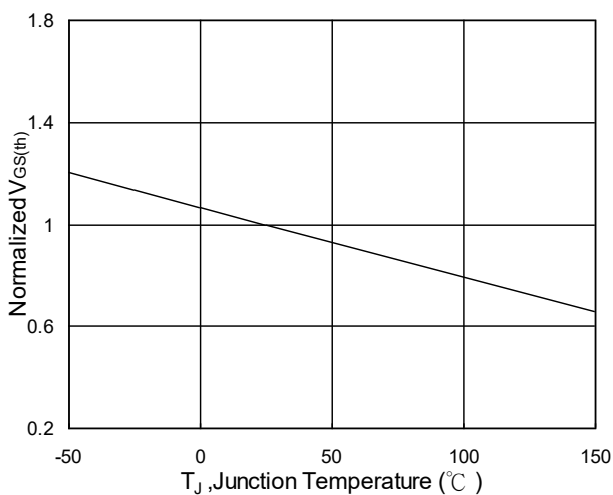


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

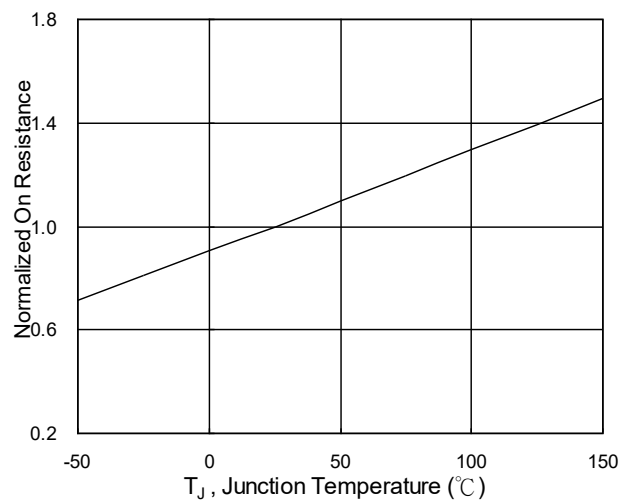


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

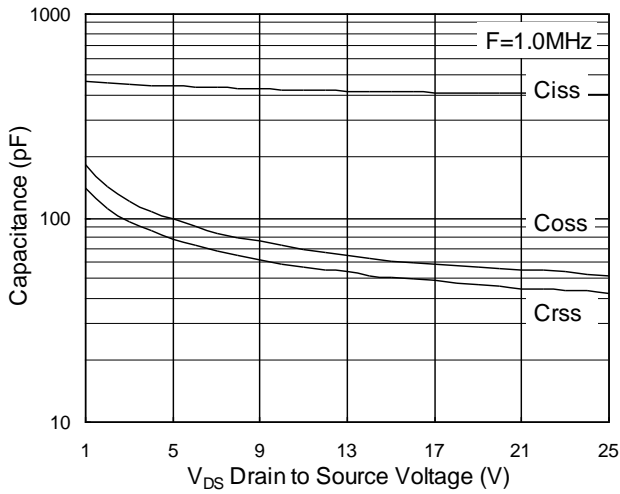


Fig.7 Capacitance

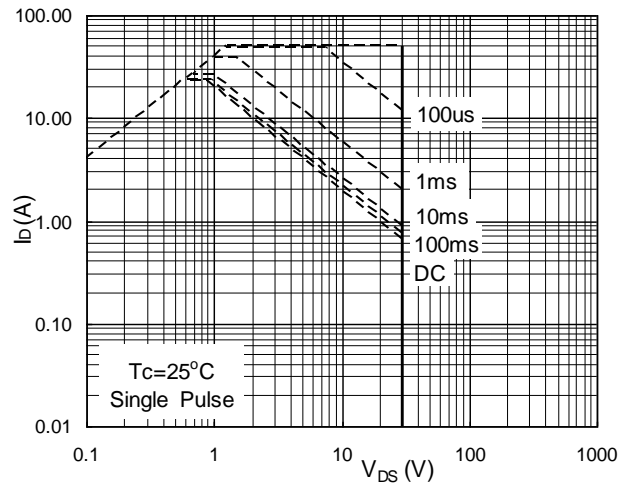


Fig.8 Safe Operating Area

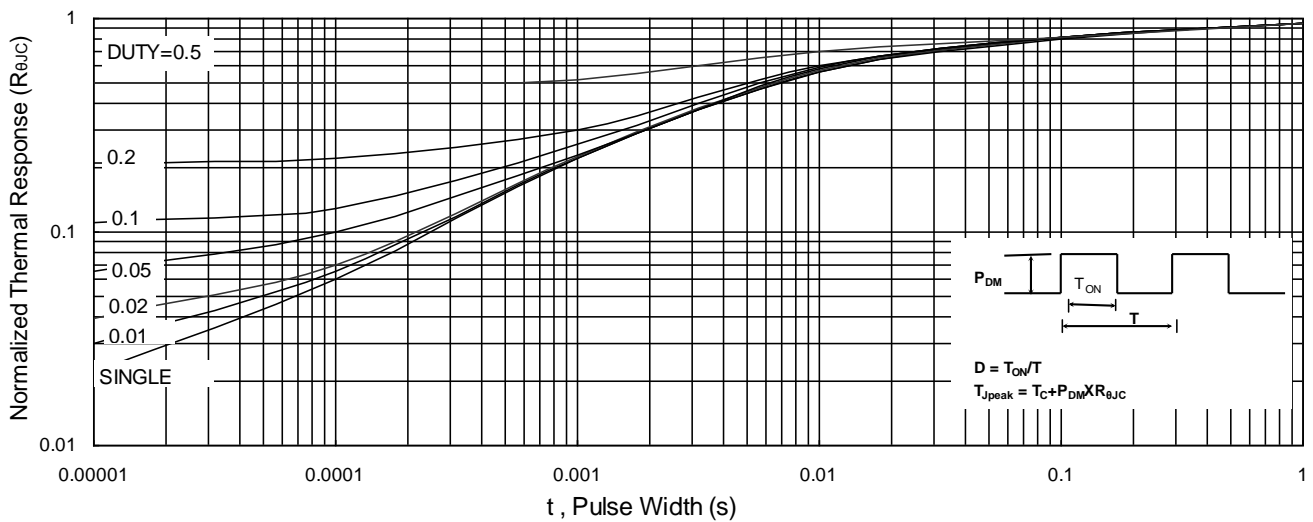


Fig.9 Normalized Maximum Transient Thermal Impedance

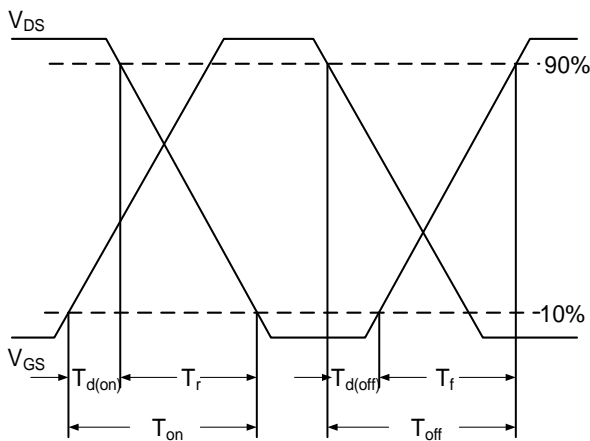


Fig.10 Switching Time Waveform

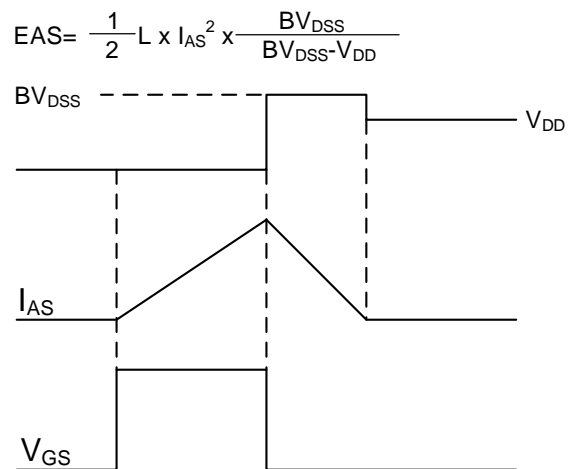
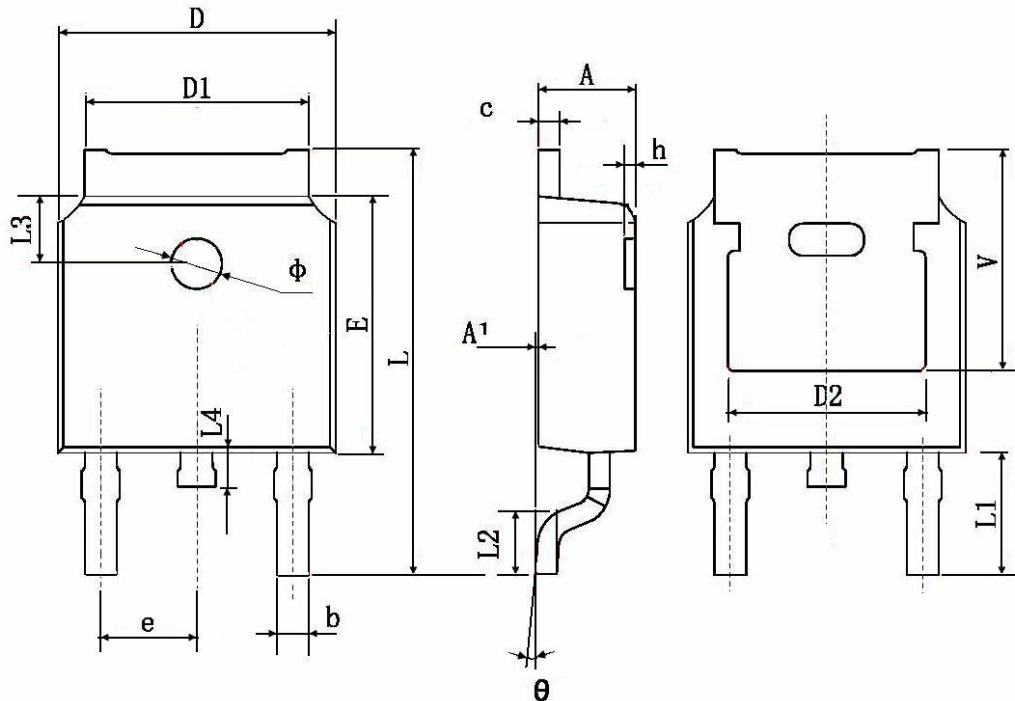


Fig.11 Unclamped Inductive Switching Waveform



TO-252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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