Prisemi®

PSMTO04R1

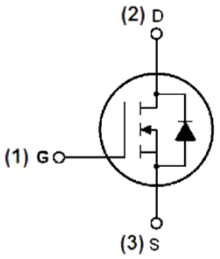
N-Channel MOSFET

Description

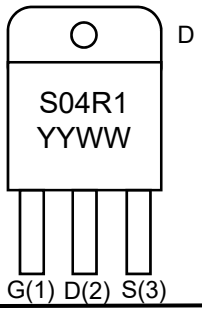
The PSMTO04R1 uses split gate trench technology to provide excellent $R_{DS(ON)}$ low gate charge. This device is suitable for power management and high efficiency applications at high switching frequencies applications.

MOSFET Product Summary	
V_{DS}(V)	$R_{DS(on)}$(mΩ)
40	1.8@ V_{GS} = 10V

TO-220 (Top View)



Schematic diagram



Marking (Top View)

Feature

- Low $R_{DS(ON)}$ - Ensures On-State Losses are Minimized
- Excellent Q_{gd} x $R_{DS(ON)}$ Product(FOM)
- Advanced Technology for DC-DC Converts
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- 100% UIS (Avalanche) Rated
- Lead-Free Finish ; RoHS Compliant
- Halogen and Antimony Free. "Green" Device

Applications

- PWM applications
- Load switch
- Power management
- DC-DC Converters
- Wireless Chargers

Absolute maximum rating@25℃

Rating		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous[1]	T_C=25℃	I_D	224.5	A
	T_C=100℃		142	
Pulsed Drain Current[2]		I_{DM}	880	A
Total Power Dissipation[3]		P_D	201.6	W
Avalanche Current[4]		I_{AS}	41.67	A
Avalanche Energy[4]		E_{AS}	86.81	mJ
Thermal Resistance , Junction-case[5]		$R_{\theta JC}$	3.74	℃/W
Thermal Resistance Junction-to-Ambient[5]		$R_{\theta JA}$	38.69	℃/W
Junction and Storage Temperature Range		T_J,T_{STG}	-55~+150	℃

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
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	-	-	1.0	μA
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	1.0	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V,I_D = 6A	-	1.8	2.4	mΩ
		V_{GS} = 4.5V,I_D = 6A	-	2.2	4.0	
Dynamic Characteristics[6)]						
Input Capacitance	C_{lss}	V_{DS} = 20V,V_{GS} = 0V, f = 1.0MHz	-	7954	-	pF
Output Capacitance	C_{oss}		-	1379	-	
Reverse Transfer Capacitance	C_{rss}		-	45.87	-	
Switching Characteristics[6)]						
Turn-on Delay Time	$t_{d(on)}$	V_{DS} = 20V, V_{GS} = 10V, R_G = 10Ω, I_D = 6A	-	28.1	-	ns
Turn-on Rise Time	t_r		-	31.6	-	
Turn-Off Delay Time	$t_{d(off)}$		-	161.1	-	
Turn-Off Fall Time	t_f		-	42.5	-	
Total Gate Charge	Q_g	V_{DS} = 20V, V_{GS} = 10V, I_D = 6A	-	83.1	-	nC
Gate-Source Charge	Q_{gs}		-	22.5	-	
Gate-Drain Charge	Q_{gd}		-	6.7	-	
Gate Resistance	R_g	V_{GS}=0V,V_{DS}=0V,f=1MHz	-	1.0	-	Ω
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V,I_S = 50A	-	-	1.3	V

Notes:
1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. Repetitive Rating: Pulse width limited by maximum junction temperature(T_{J_Max}=150℃).
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. This single-pulse measurement was taken under the following condition (L=100uH,V_{GS}=10V,V_{DS}=50V)while it's value is limited by T_{J_Max}=150℃.
5. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout.
6. Guaranteed by design, not subject to production.

Typical Characteristics

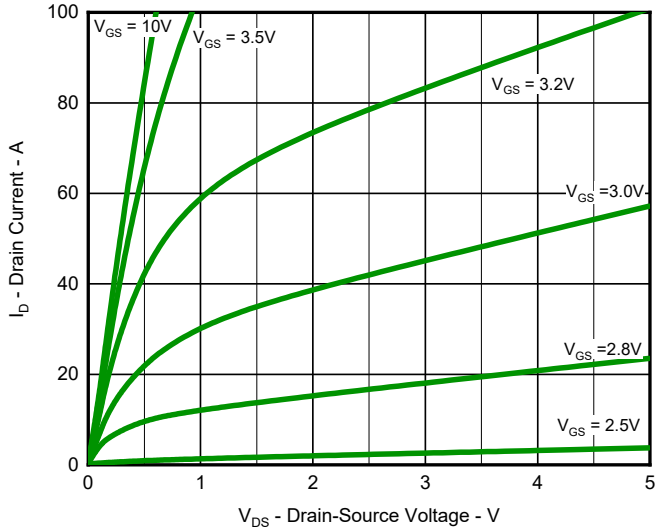


Fig.1 Output Characteristics

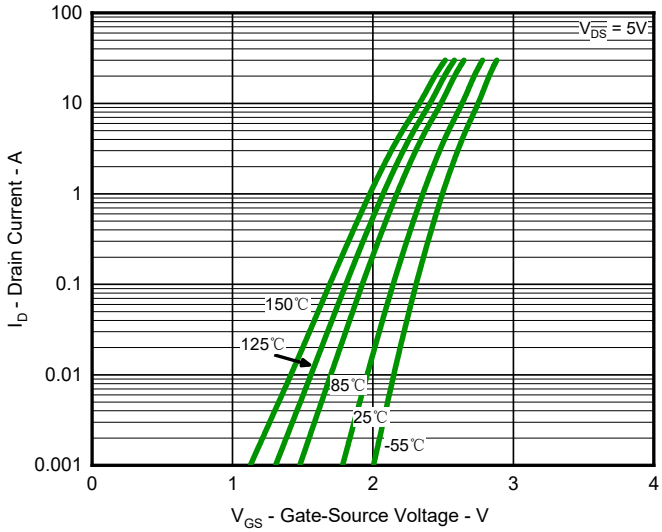


Fig.2 Typical Transfer Characteristic

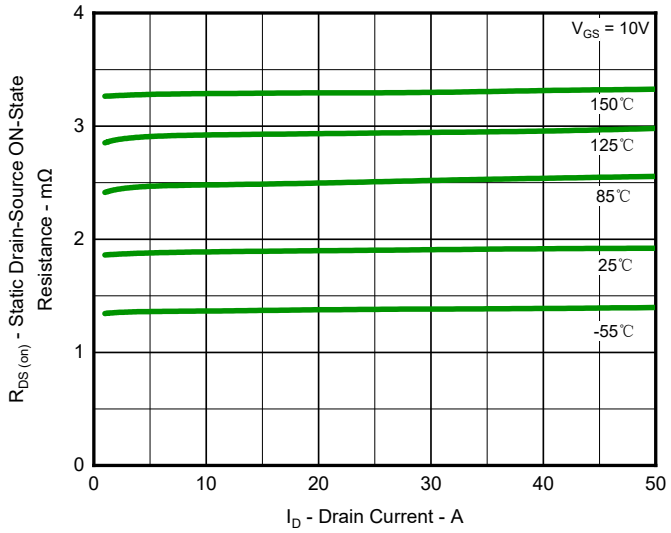


Fig.3 Typical On-Resistance vs Drain Current and Temperature

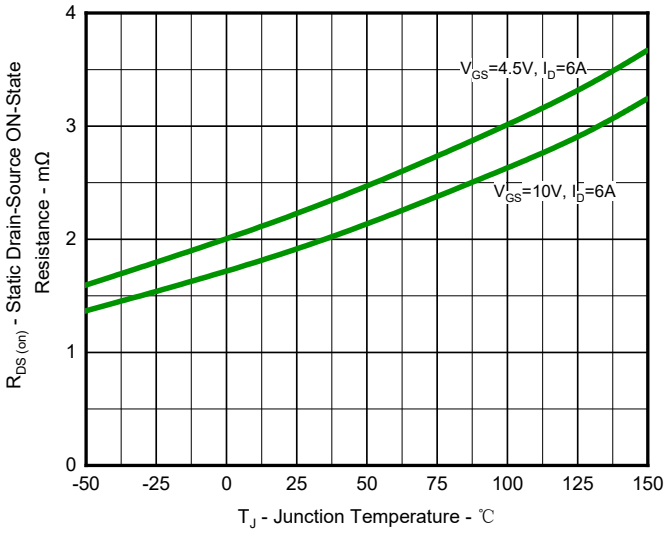


Fig.4 On-Resistance Variation with Temperature

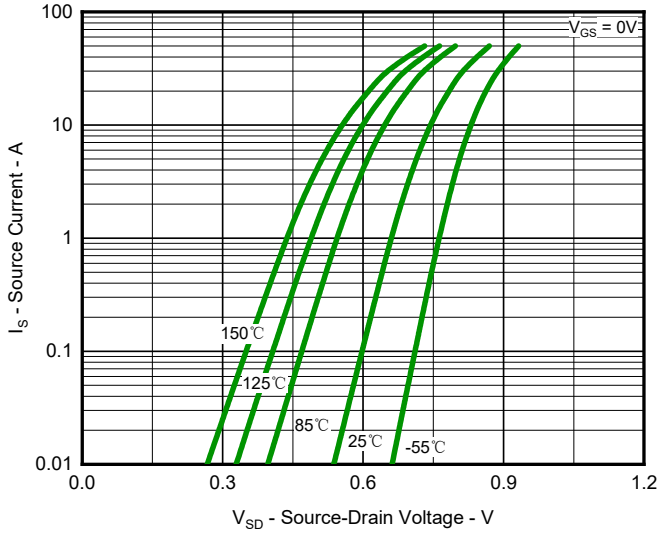


Fig.5 Diode Forward Voltage vs. Current

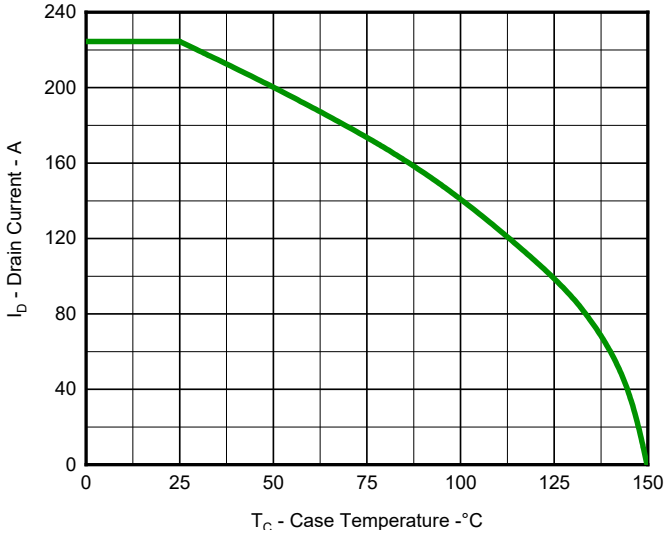


Fig.6 Maximun Drain Current vs. Case Temperature

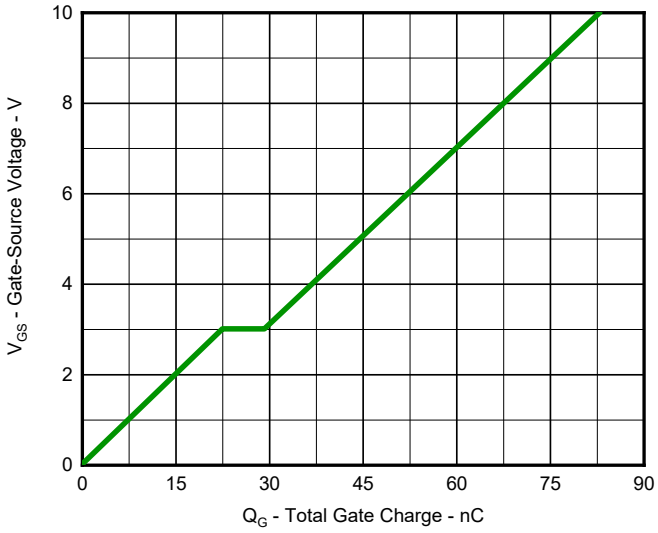


Fig.7 Gate Charge Characteristics

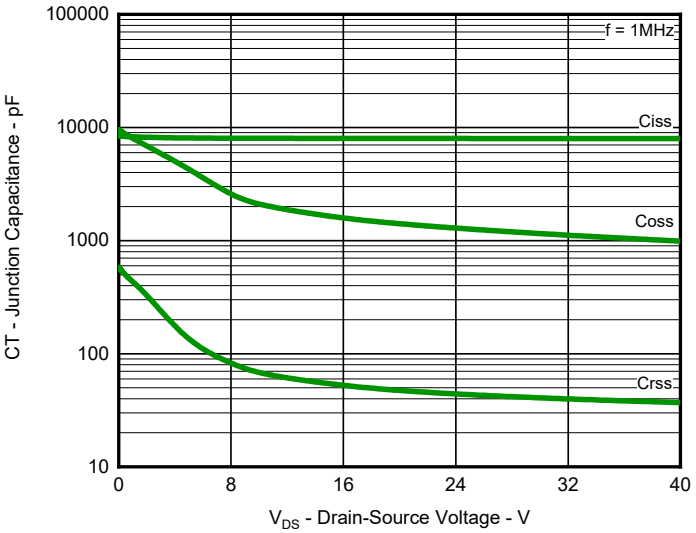


Fig.8 Typical Junction Capacitance

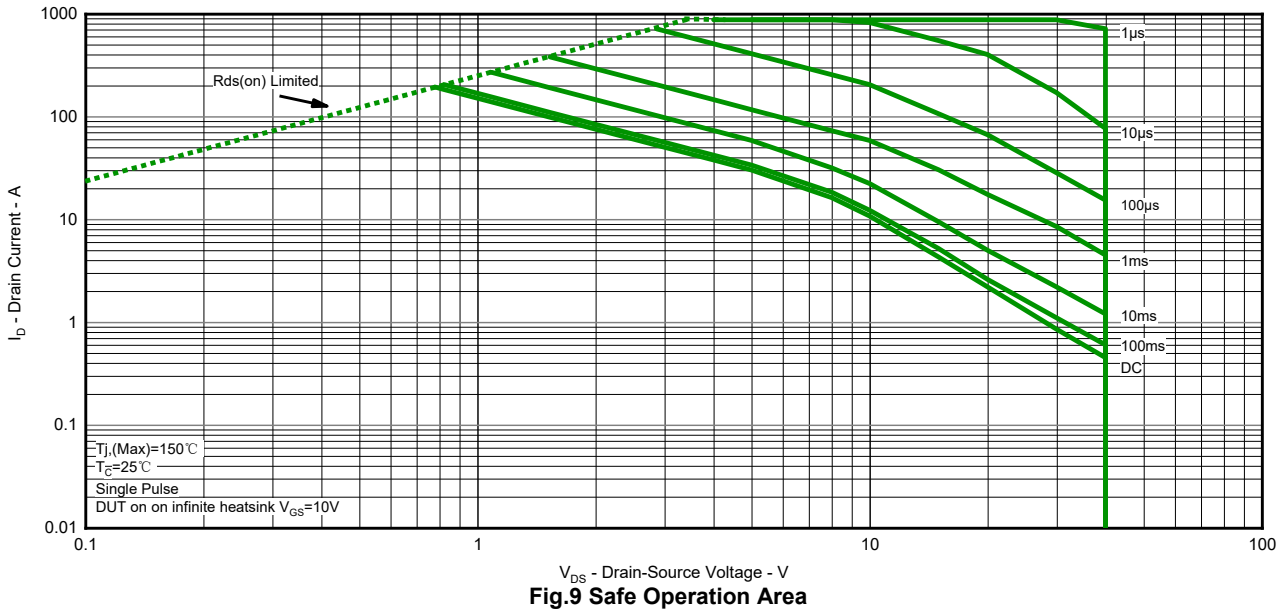


Fig.9 Safe Operation Area

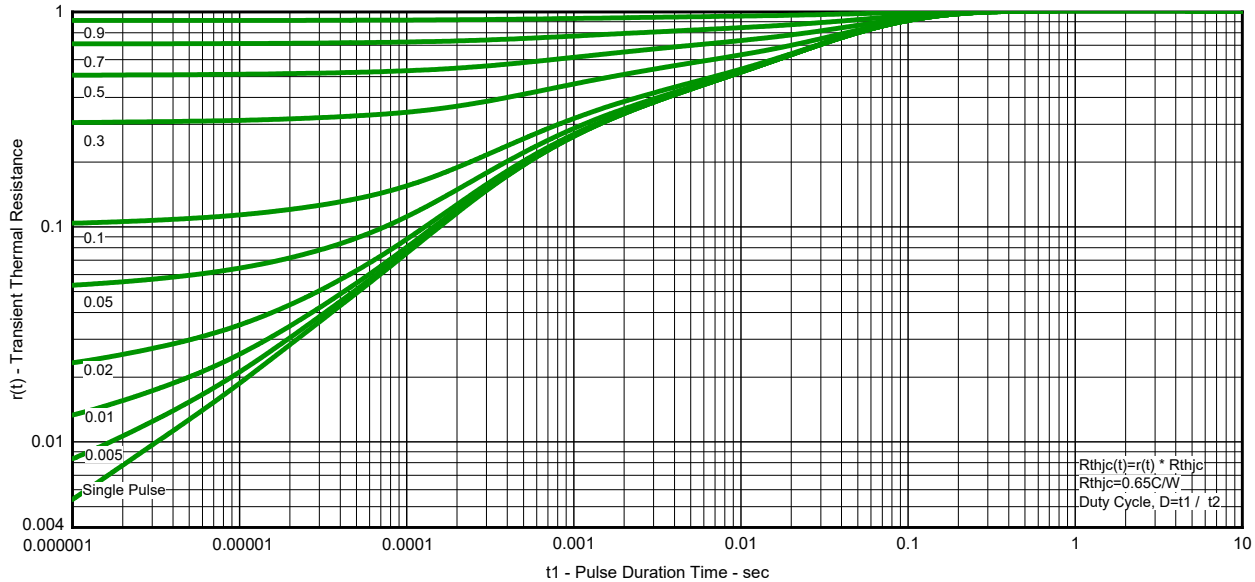
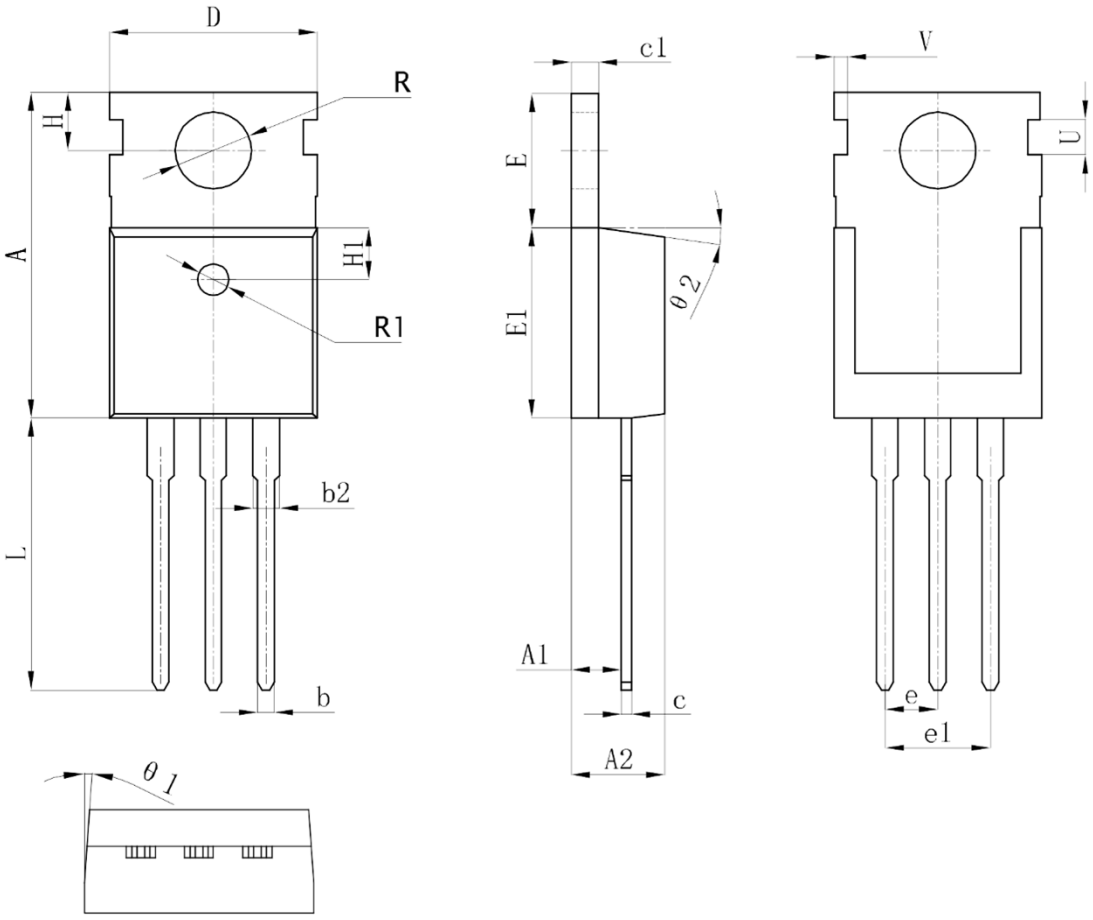


Fig.10 Transient Thermal Resistance

Product dimension (TO-220)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	15.40	15.80	0.606	0.622	e1	4.84	5.32	0.191	0.209
A1	2.35	2.50	0.093	0.098	H	2.73	2.87	0.107	0.113
A2	4.40	4.70	0.173	0.185	H1	2.40	2.60	0.094	0.102
b	0.70	0.90	0.028	0.035	L	13.02	13.72	0.513	0.540
b2	1.18	1.44	0.046	0.057	R	3.50	3.63	0.138	0.143
c	0.48	0.56	0.019	0.022	R1	1.40	1.60	0.055	0.063
c1	1.29	1.32	0.051	0.052	U	1.65	1.85	0.065	0.073
D	9.80	10.20	0.386	0.402	V	0.58	0.78	0.023	0.031
E	6.40	6.60	0.252	0.260	θ1	2°	3°	2°	3°
E1	9.00	9.20	0.354	0.362	θ2	6.5°	7.5°	6.5°	7.5°
e	2.42	2.66	0.095	0.105					

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◉新增 ○修订		申请部门	研发部	申请日期	2023-01-05
版本	**修改说明**			**申请/修改者**	**生效日期**
6.0	新增，只填写静态数据，C25尺寸			Bert/Tim	2023-01-05
	根据实测数据，补全参数和曲线图			Bert/Tim	2023-01-16
审核	Maksim	日期	2023-01-05	核准	Ken 日期 2023-01-05