TPSIR401DP-T1-GE3
P-Channel Enhancement MOSFET

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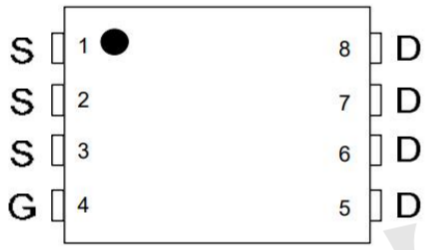
Product Summary

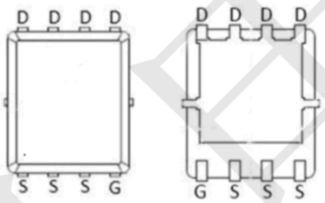
- V_{DS} -20 V
- I_{DS} (at V_{GS}=-10V) -90A
- $R_{DS\ (ON)}$ (at V_{GS}=-10V) ≤2.3mΩ(TYP)

Application

- Reverse Battery protection
- Load switch
- Power management
- PWM Application

Package and Pin Configuration





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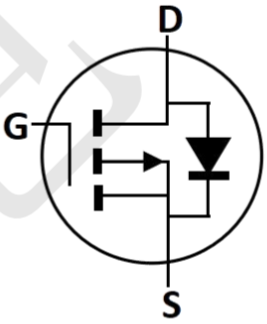
Circuit diagram



Equivalent Circuit

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_C=25℃	I_D	-90	A
	T_C=100℃		-75	
Pulsed Drain Current		I_{DM}	-180	A
Single Pulse Avalanche Energy		EAS	370	mJ
Total Power Dissipation	T_C=25℃	P_{DTOT}	150	W
Operating Junction Temperature Range		T_J	-55 to +150	℃
Storage Temperature Range		T_{stg}	-55 to +150	℃

Thermal Characteristic

PARAMETER		Symbol	Value	Unit
Junction-to-Ambient Thermal Resistance	PCB Mount (Note)	$R_{\theta JA}$	60	°C/W
Thermal Resistance Junction-Case		$R_{\theta JC}$	0.9	°C/W

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

Electrical Characteristics (T_A=25℃unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	BV_{DSS}	-20	--	--	V
Gate-Source Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	$V_{GS(th)}$	-0.4	-0.6	-1.0	V
Gate-Source Leakage	V_{DS}=0V, V_{GS}= ±12V	I_{GSS}	--	--	±500	nA
Zero Gate Voltage Drain Current	V_{DS}= -20V, V_{GS}=0V	I_{DSS}	--	-0.1	-1.0	μA
	V_{DS}=-20V, T_J=55°C		--	-1.0	-5.0	μA
Drain-Source On-State Resistance (Note 1)	V_{GS}=-10V, I_D= -20A	R_{DS}(on)	--	2.3	2.5	mΩ
	V_{GS}=-4.5V, I_D= -20A		--	3.0	5.0	
	V_{GS}=-2.5V, I_D= -20A		--	4.3	6.0	
Forward Trans conductance	V_{DS} = -5V,I_D = -20A	g_{FS}	--	120	--	S
Dynamic (Note 2)						
Total Gate Charge (Note 3)	V_{DS} = -10V,	Q_g	--	136	--	nC
Gate-Source Charge (Note 3)	I_D = -20A,	Q_{gs}	--	32	--	
Gate-Drain Charge (Note 3)	V_{GS} = -10V	Q_{gd}	--	16	--	
Input Capacitance	V_{DS} = -10V,	C_{iss}	--	9246	--	pF
Output Capacitance	V_{GS} = 0V,	C_{oss}	--	1570	--	
Reverse Transfer Capacitance	F= 1.0MHz	C_{rss}	--	1180	--	
Switching						
Turn-On Delay Time (Note 3)	V_{DD} = -10V,	$t_{d(on)}$	--	22	--	nS
Rise Time (Note 3)	I_D= -20A,	t_r	--	170	--	
Turn-Off Delay Time (Note 3)	V_{GS} = -10V,	$t_{d(off)}$	--	90	--	
Fall Time (Note 3)	R_G = 3.3Ω	t_f	--	26	--	
Source-Drain Diode Ratings and Characteristics (Note 2)						
Forward Voltage	V_{GS} = 0V, I_F = -20A	V_{SD}	--	-0.7	-1.2	V
Continuous Source Current	Integral reverse diode in the MOSFET	I_S	--	--	-90	A
Pulsed Current (Note 1)		I_{SM}	--	--	-180	A

Notes:

1. Pulse test; pulse width ≤ 300 μS, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

Typical Electrical and Thermal Characteristics

Figure 1. Output Characteristics

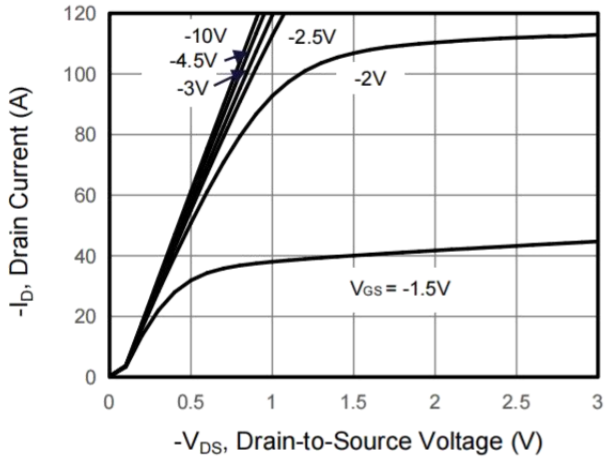


Figure 2. Transfer Characteristics

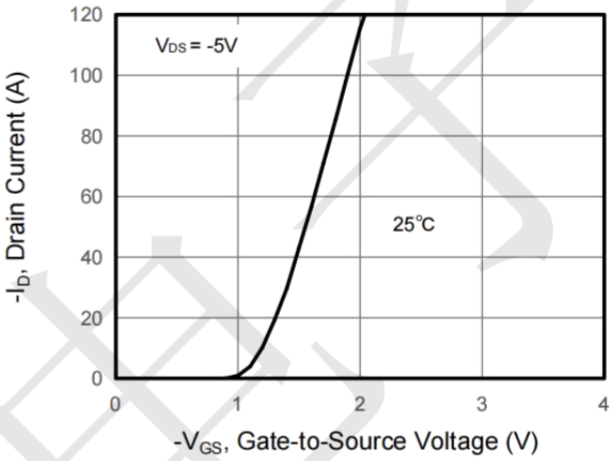


Figure 3.Drain Source On Resistance

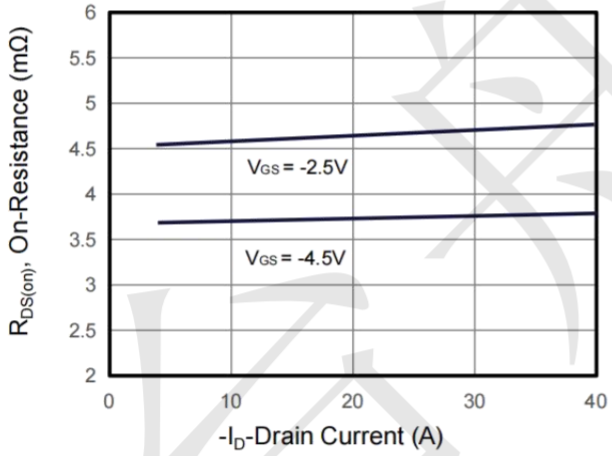


Figure 4. Gate Charge

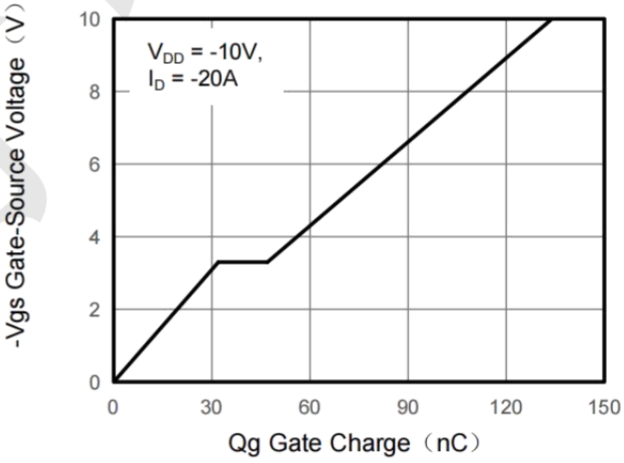


Figure 5. Capacitance

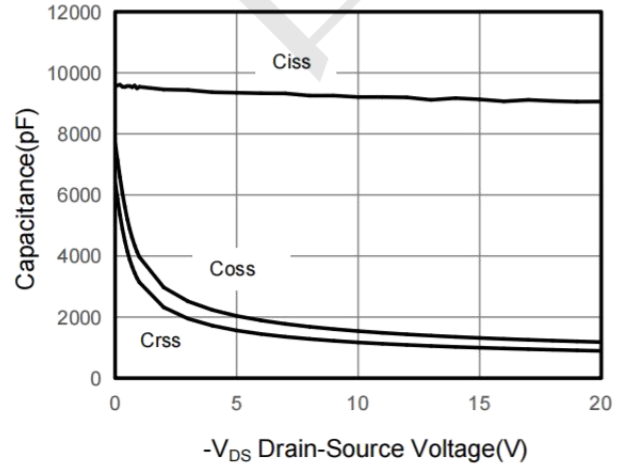
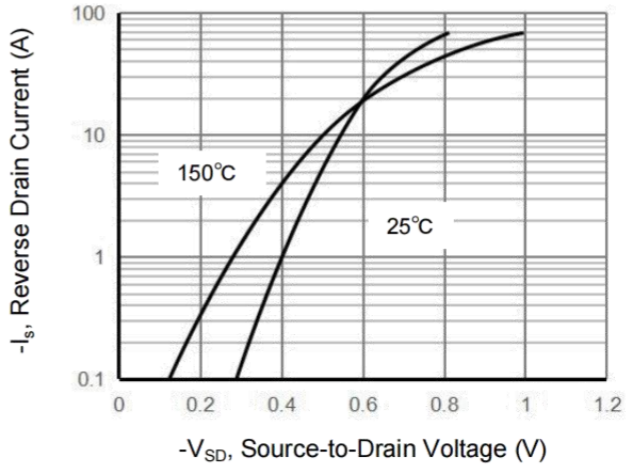


Figure 6. Source-Drain Diode Forward



Package Information

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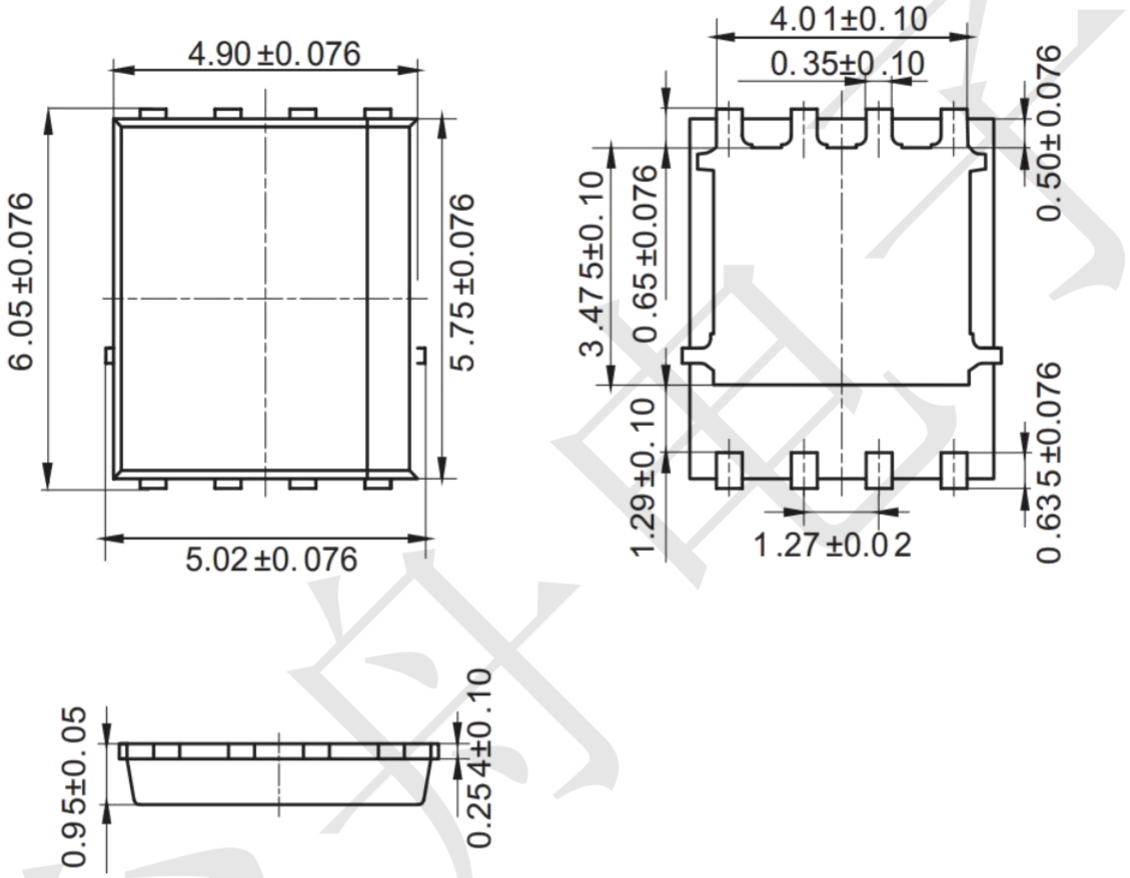

Mounting Pad Layout (unit: mm)