



Marking: 3012

P-Channel Enhancement Mode Power MOSFET

3012

● Features

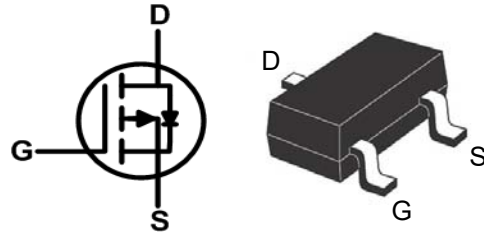
$V_{DS} = -12V$
 $I_D = -5A$
 $R_{DS(ON)} \leq 0.032\Omega (V_{GS} = -4.5V)$

● General Description

The TPM3012V1SX is the high cell density trench P-ch MOSFETs, which provides excellent $R_{DS(ON)}$ and efficiency for most of the small power switching and load switch applications.

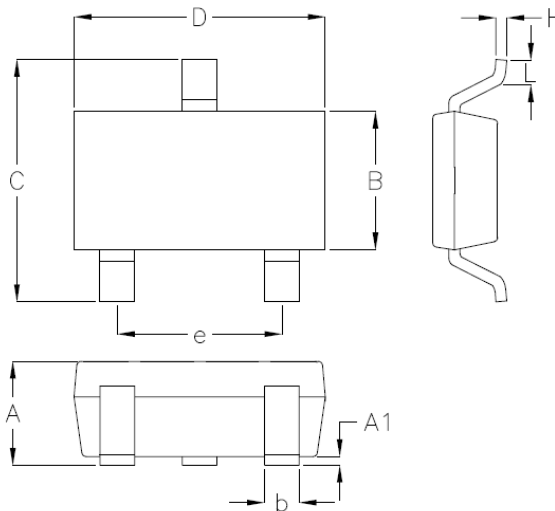
The TPM3012V1SX meet the RoHS and Green Product requirement with full function reliability approved.

● Pin Configurations



● Package Information

SOT23-3L



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.890	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.356	0.508	0.014	0.020
C	2.591	3.010	0.102	0.119
D	2.692	3.099	0.106	0.122
e	1.793	2.007	0.070	0.079
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024



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● **Absolute Maximum Ratings (@T_A=25°C unless otherwise noted)**

Parameter	Symbol	Ratings	Unit	
Drain-Source Voltage	V _{DSS}	-12	V	
Gate Source Voltage	V _{GSS}	±12	V	
Drain Current (Continuous) *A	I _D	T _A =25°C	-5	A
		T _A =70°C	-3.9	
Drain Current (Pulse) *B	I _{DM}	-16	A	
Power Dissipation *C	P _D	1.5	W	
Operating Temperature/ Storage Temperature	T _J /T _{STG}	-55 to 150	°C	

● **Thermal Characteristics**

Parameter	Symbol	Ratings	Unit
Thermal Resistance ,Junction-to-Ambient *A	R _{θJA}	125	°C/W
Thermal Resistance Junction-Case *A	R _{θJC}	82	°C/W

● **Electrical Characteristics (@T_A=25°C unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =-250uA		-12	-18	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-12V, V _{GS} =0V	--	--	1	uA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250uA	-0.4	--	-1	V
Gate Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	--	--	±100	nA
Drain-Source On-state Resistance *B	R _{DS(on)}	V _{GS} =-4.5V, I _D =-1A	--	23	32	mΩ
		V _{GS} =-2.5V, I _D =-0.5A	--	35	50	mΩ
Forward Transconductance	g _{fs}	I _D =-2A, V _{DS} =-5V	--	6	--	S
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHZ	--	16	32	Ω
Total Gate Charge	Q _g	V _{GS} =-4.5V, V _{DD} =-10V, I _D =-4A	--	8	--	nC
Gate- Source Charge	Q _{gs}		--	1.14	--	nC
Gate- Drain Charge	Q _{gd}		--	1.5	--	nC
Turn-on Delay Time	t _{d(on)}	V _{GS} =-4.5V, V _{DD} =-10V, R _L =2.5Ω, R _{GEN} =3Ω	--	13.6	--	ns
Turn-on Rise Time	t _r		--	35	--	ns
Turn-off Delay Time	t _{d(off)}		--	32	--	ns
Turn-off Fall Time	t _f		--	10	--	ns
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =-10V, f=1MHZ	--	984	--	pF
Output Capacitance	C _{oss}		--	219	--	pF
Reverse Transfer Capacitance	C _{rss}		--	116	--	pF



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● Reverse Diode Characteristics (@TA=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Source Current *A,D	I _S	V _G =V _D =0V , Force Current	--	--	-4.6	A
Pulsed Source Current *B,D	I _{SM}		--	--	-16	A
Diode Forward Voltage *B	V _{SD}	I _{SD} =-1A, V _{GS} =0V	--	--	-1.2	V

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

B: The data tested by pulsed , pulse width \leq 300us , duty cycle \leq 2%.

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

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

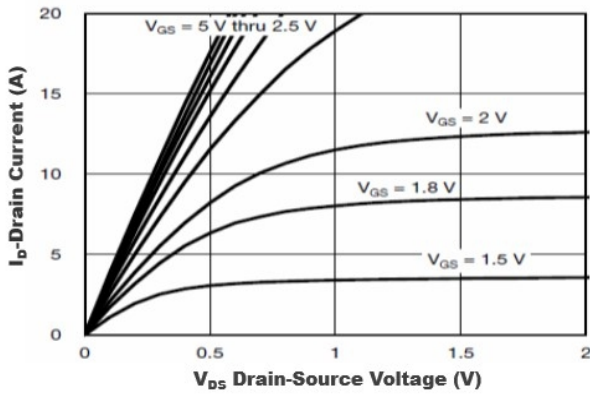
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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Figure1. Output Characteristics

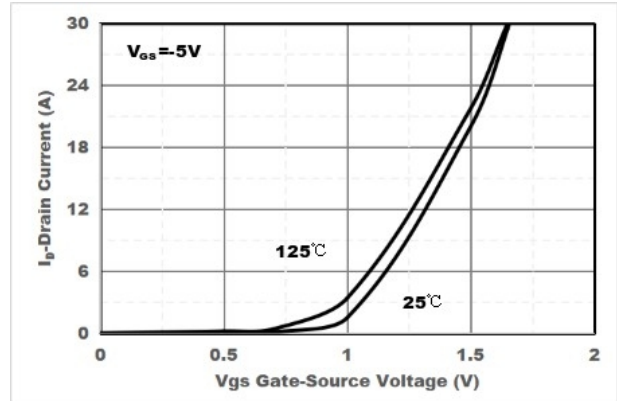


Figure2. Transfer Characteristics

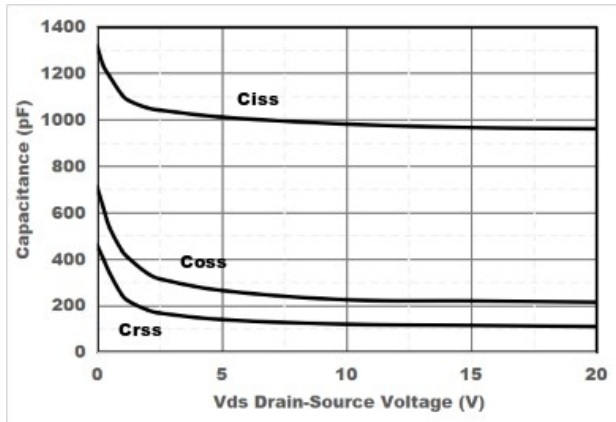


Figure3. Capacitance Characteristics

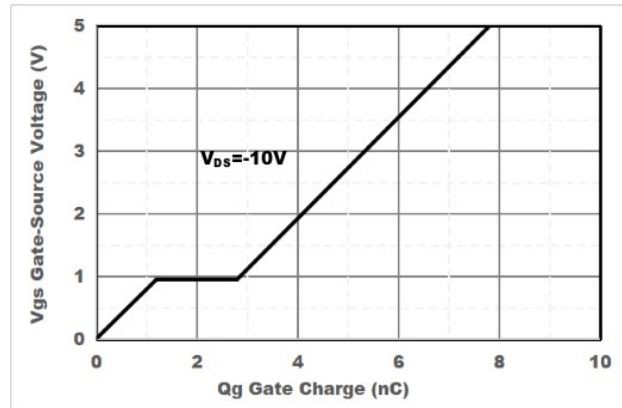


Figure4. Gate Charge

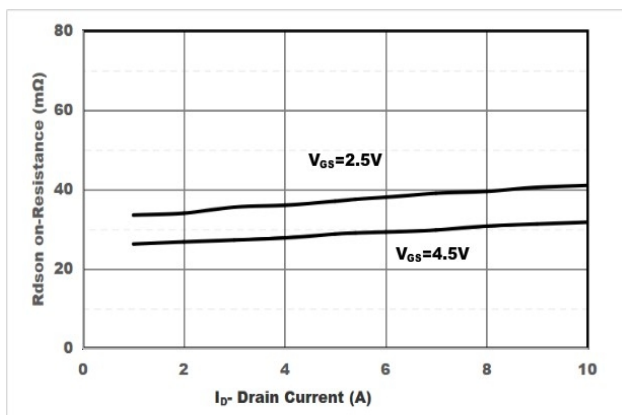


Figure5. Drain-Source on Resistance

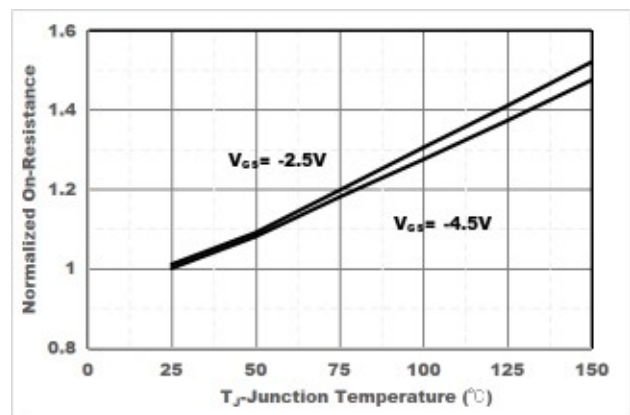


Figure6. Drain-Source on Resistance

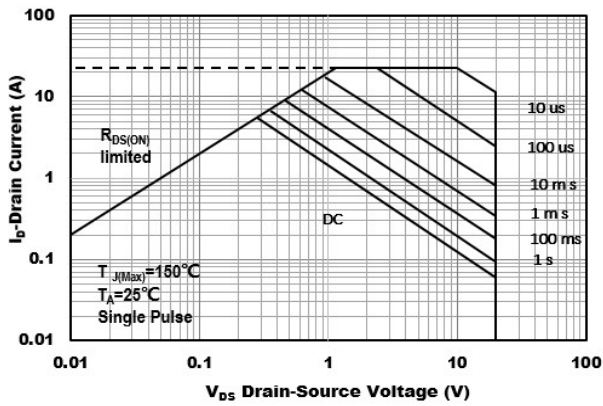
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Figure7. Safe Operation Area

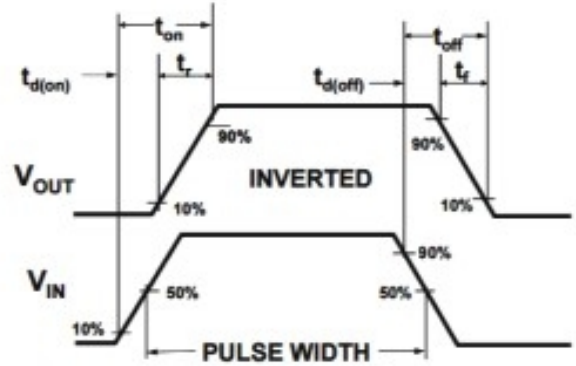
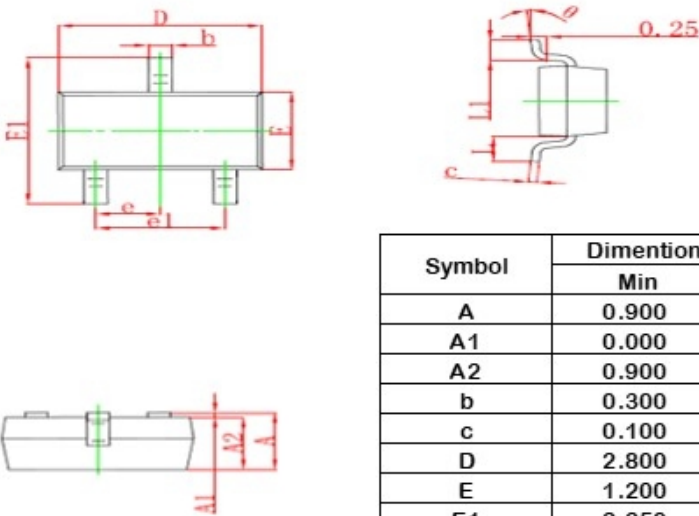


Figure8. Switching wave

SOT-23 Package information


Symbol	Dimensions in Millimeter		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950Type		0.037Type	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.220REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout
