



TM02P02I3

P-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

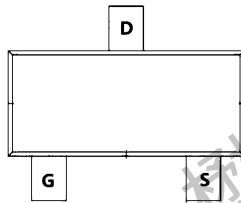
General Features

$V_{DS} = -20V$ $I_D = -2.0A$

$R_{DS(ON)} = 87m\Omega$ (typ.) @ $V_{GS} = -4.5V$

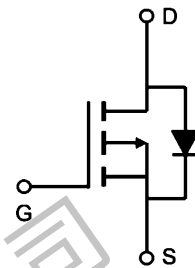
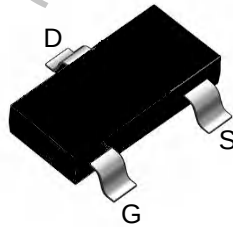
100% UIS Tested

100% R_g Tested



Marking: TS1

I3: SOT-323



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-2	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V$	-1	A
I_{DM}	Pulsed Drain Current	-8	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation	1	W
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient	---	120	$^\circ C/W$
R	Thermal Resistance Junction Case			$^\circ C/W$



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Electrical Characteristics: $T=25^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Sourctce Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	-20	---	---	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{GS} =0V, V _{DS} =-20V	---	---	-1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0A	---	---	±100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	-0.4	-0.62	-1.0	V
R _{DS(ON)}	Drain-Source On Resistance	V _{GS} =-4.5V, I _D =-2A	---	87	105	m Ω
		V _{GS} =-2.5V, I _D =-1A	---	106	140	m Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	245	---	pF
C _{oss}	Output Capacitance		---	35	---	
C _{rss}	Reverse Transfer Capacitance		---	25	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} =-10V, I _D =-2A, R _{ENG} =3 Ω, V _{GS} =-4.5V	---	5	---	ns
t _r	Rise Time		---	18.9	---	ns
t _{d(off)}	Turn-Off Delay Time		---	82.9	---	ns
t _f	Fall Time		---	44	---	ns
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-2A	---	2.4	---	nC
Q _{gs}	Gate-Source Charge		---	0.6	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	0.4	---	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =-2A	---	---	-1.2	V
I _S	Continuous Drain Curren	V _D =V _G =0V	---	---	-2	A
I _{SM}	Pulsed Drain Current		---	---	-8	A
T _{rr}	Reverse Recovery Time	I _F =-2A	---	4.4	---	ns
Q _{rr}	Reverse Recovery Charge	dI/dt=100A/us	---	0.6	---	nC

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Typical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

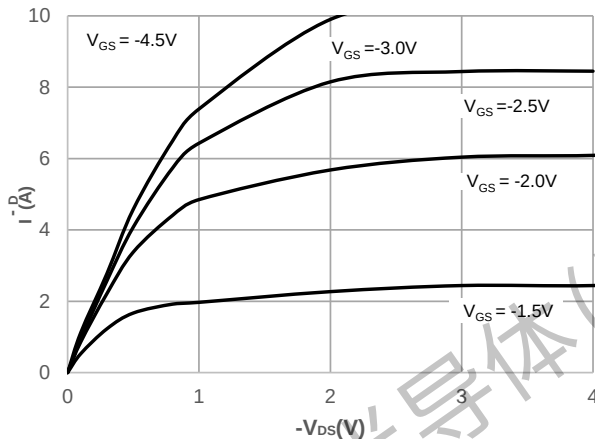


Figure 1: Output Characteristics

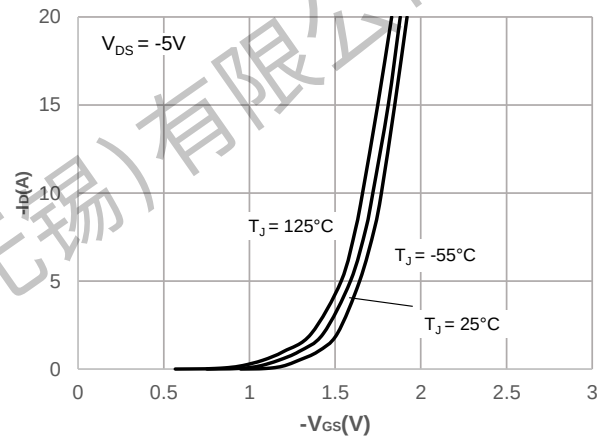


Figure 2: Typical Transfer Characteristics

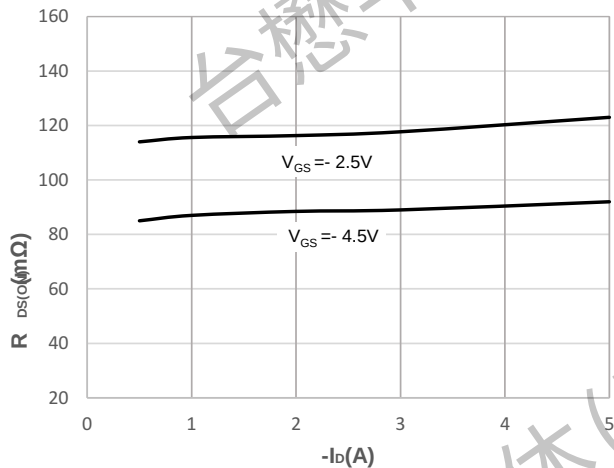


Figure 3: On-resistance vs. Drain Current

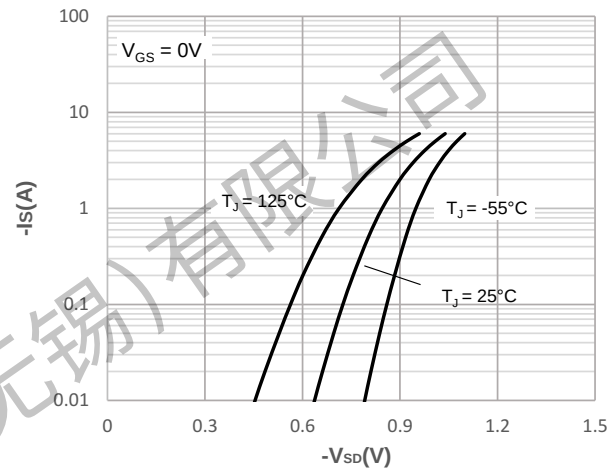


Figure 4: Body Diode Characteristics

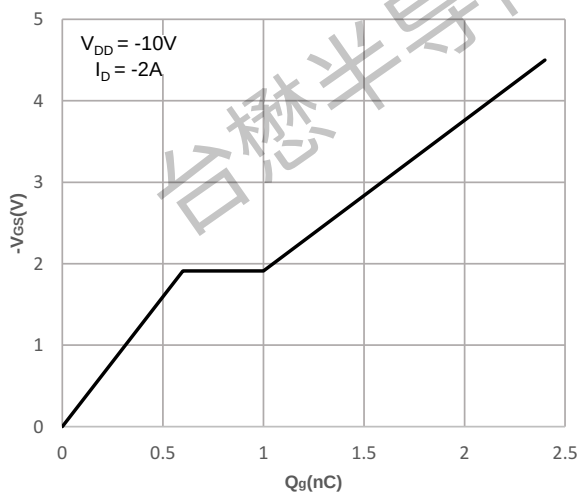


Figure 5: Gate Charge Characteristics

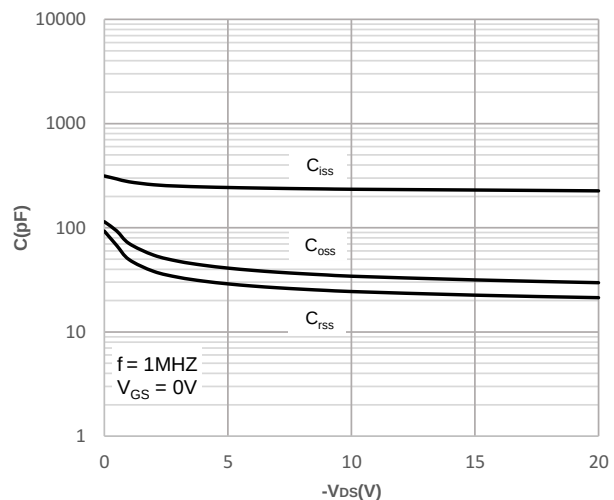


Figure 6: Capacitance Characteristics

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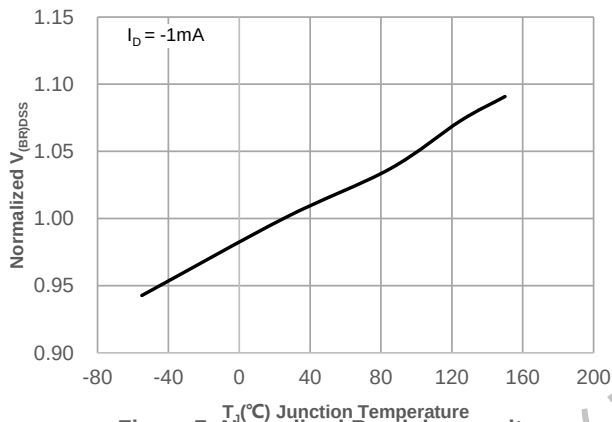


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

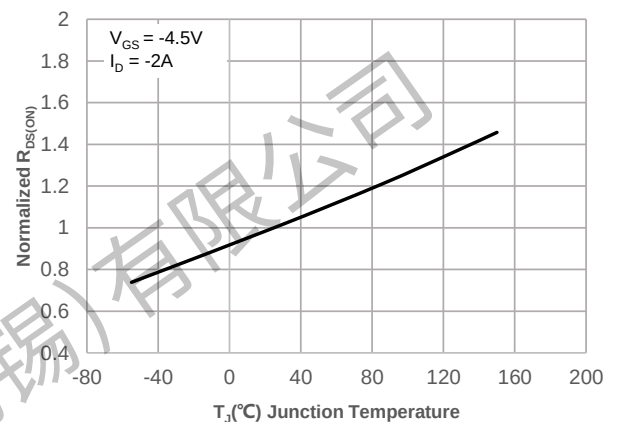


Figure 8: Normalized on Resistance vs. Junction Temperature

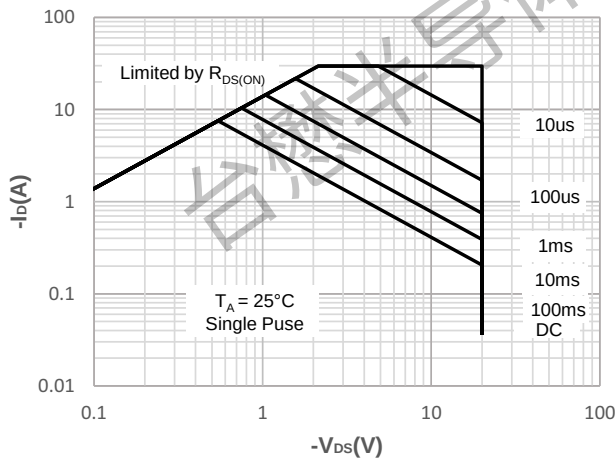


Figure 9: Maximum Safe Operating Area

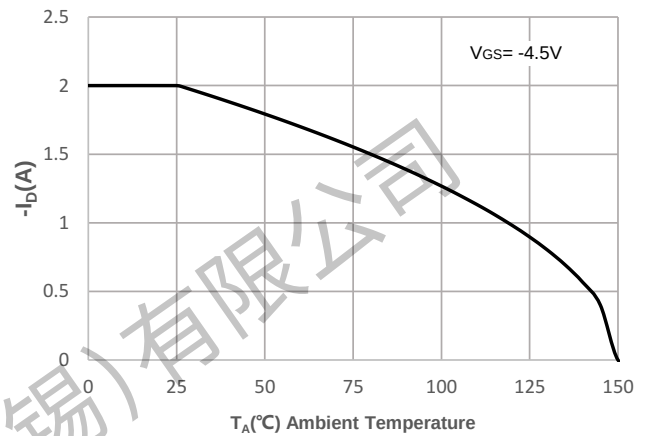


Figure 10: Maximum Continuous Driant Current vs. Ambient Temperature

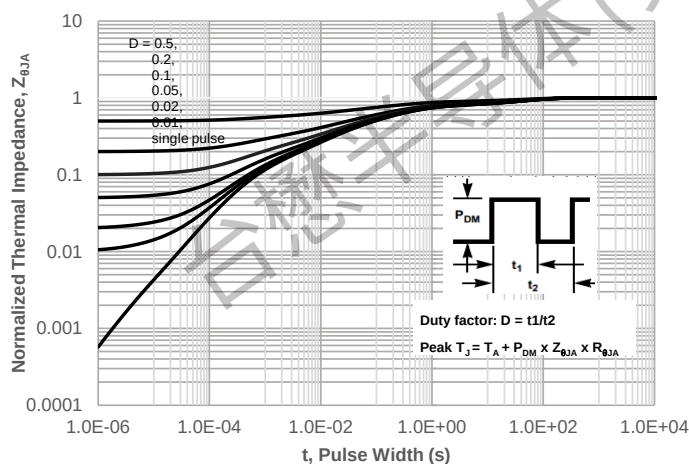


Figure 11: Normalized Maximum Transient Thermal Impedance

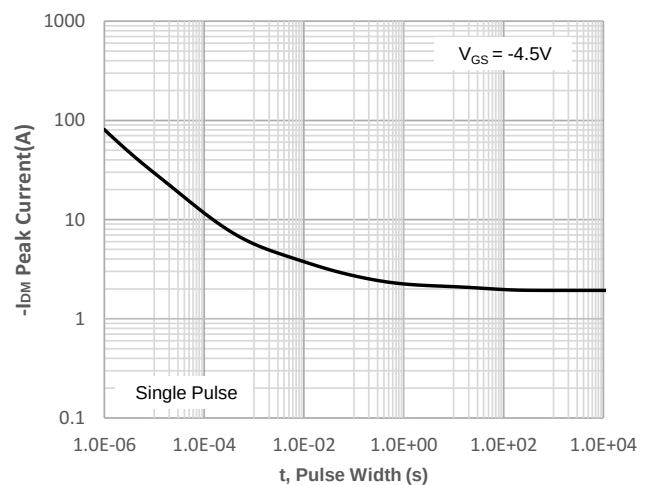


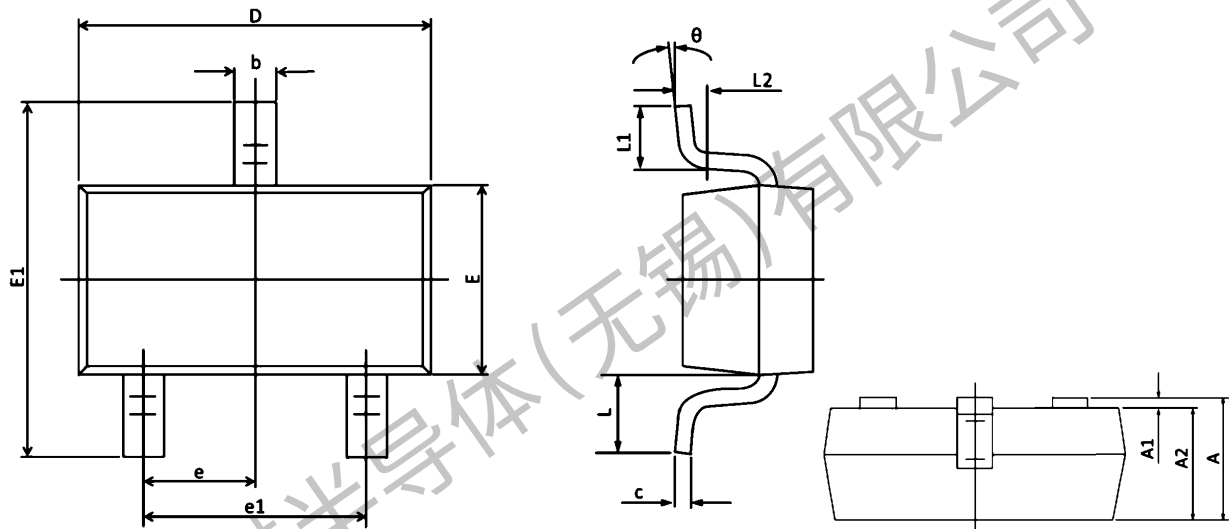
Figure 12: Peak Current Capacity



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Package Mechanical Data:SOT-323



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.100	0.800	0.043	0.031
A1	0.100	0.000	0.004	0.000
A2	1.000	0.800	0.039	0.031
b	0.400	0.200	0.016	0.008
c	0.250	0.080	0.010	0.003
D	2.200	1.800	0.087	0.071
E	1.350	1.150	0.053	0.045
E1	2.450	1.800	0.096	0.071
e	0.65BSC		0.026BSC	
e1	1.400	1.200	0.055	0.047
L	0.525REF.		0.021REF.	
L1	0.460	0.150	0.018	0.006
L2	0.200	0.000	0.008	0.000
θ	8°	0°	8°	0°

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Revision history:

Date	Rev	Description	Page
2023.06.16	23.06	Original	