TM05N02I N-Channel Enhancement Mosfet

General Description

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

Applications

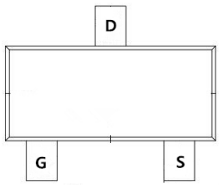
• Load switch
• PWM

Product Summary

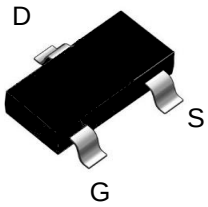
V_{DS} = 20V I_D =5.0A
$R_{DS(ON)}$ =22 mΩ(typ.)@ V_{GS}=4.5V

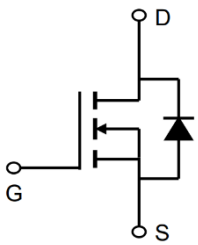
100% UIS Tested
100% R_g Tested

I:SOT-23



Marking: 2300





Absolute Maximum Ratings (T_C=25℃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℃	Continuous Drain Current, V_{GS} @ 10V[1]	5.0	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	2.8	A
I_{DM}	Pulsed Drain Current[2]	15.0	A
P_D@T_A=25℃	Total Power Dissipation[3]	1	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient [1]	---	125	℃/W
$R_{\theta JC}$	Thermal Resistance Junction Case[1]	---	80	℃/W

Electrical Characteristics (T_J=25 ˚C, unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	20	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =20 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} = 16V, T_C = 125℃	--	--	10	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 10V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -10 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	0.45	0.7	1.1	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 4.5 V, I_D =3.5A	--	22	30	mΩ
		V_{GS} = 2.5 V, I_D =2.0A	-	29	37	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 10V, V_{GS} = 0 V, f = 1.0 MHz	--	228	-	pF
C_{oss}	Output Capacitance		--	37	-	pF
C_{rss}	Reverse Transfer Capacitance		--	34	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS}=5 V, V_{DS}=10V, I_D =3A, R_G = 6 Ω ,R_L = 2.7 Ω	--	4.5	--	ns
t_r	Turn-On Rise Time		--	31	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	12	--	ns
t_f	Turn-Off Fall Time		--	4.0	--	ns
Q_g	Total Gate Charge	V_{DS} = 10 V, I_D =3A, V_{GS} = 5V	--	6.23	--	nC
Q_{gs}	Gate-Source Charge		--	6	--	nC
Q_{gd}	Gate-Drain Charge		--	0.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	5.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	10.5	A
V_{SD}	Drain to Source Diode Forward Voltage,V_{GS} = 0V, I_{SD} =3.5A,T J = 25℃		--	--	1.2	V

Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Device mounted on FR-4 PCB, 1inch x 0.85inch x 0.062 inch
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

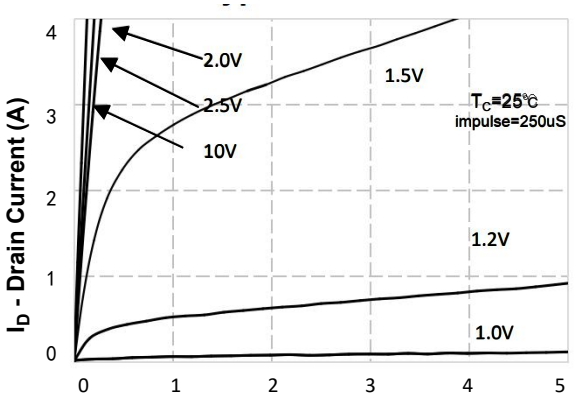


Figure 1. On-Region Characteristics

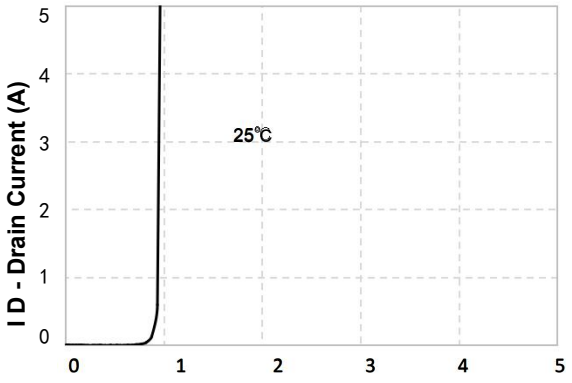


Figure 2. Transfer Characteristics

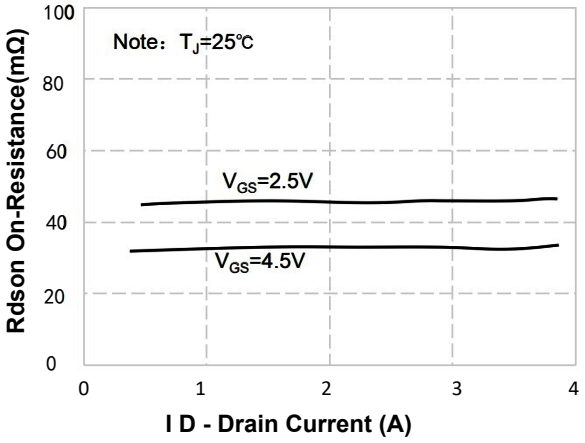


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

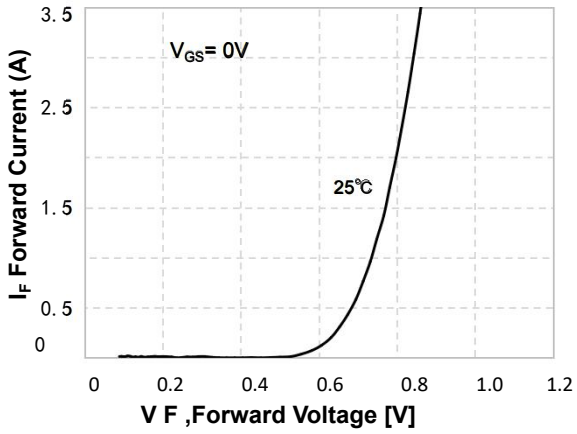


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

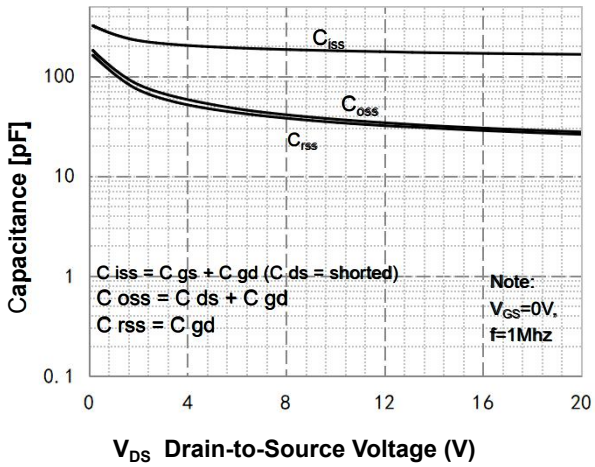


Figure 5. Capacitance Characteristics

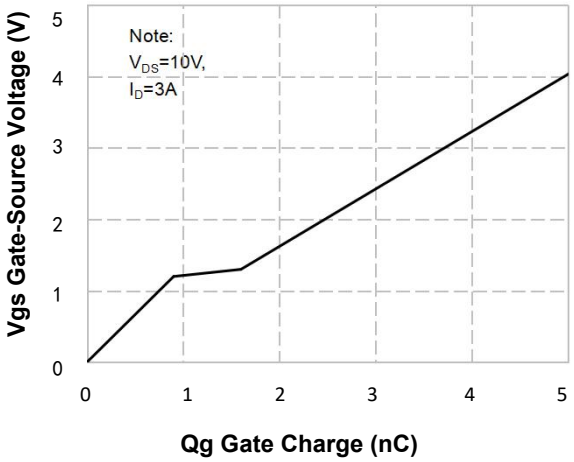


Figure 6. Gate Charge Characteristics

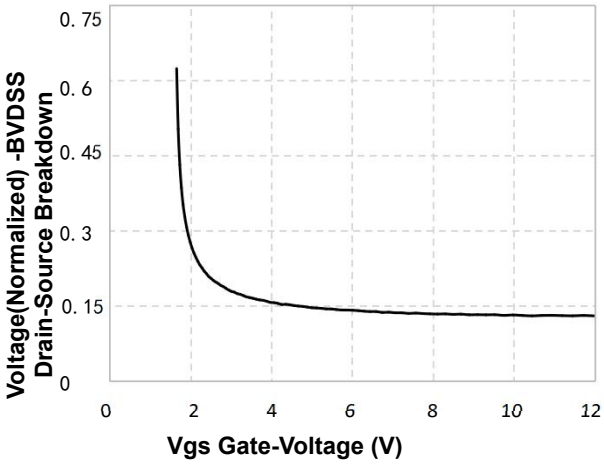


Figure 7. Breakdown Voltage Variation vs Gate-Voltage

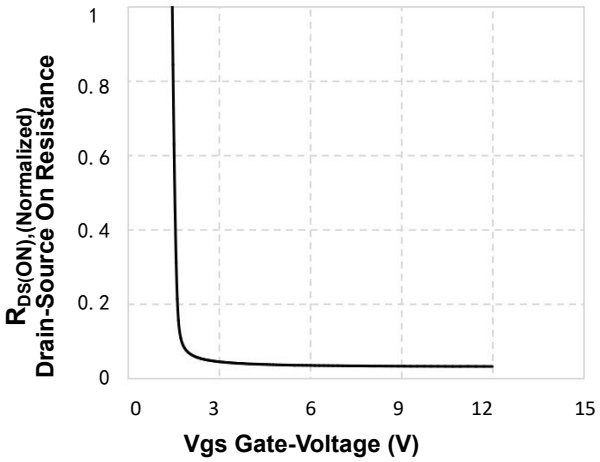


Figure 8. On-Resistance Variation vs Gate Voltage

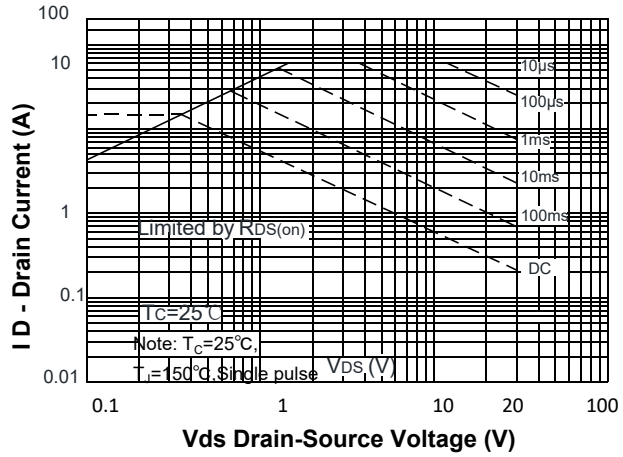


Figure 9. Maximum Safe Operating Area

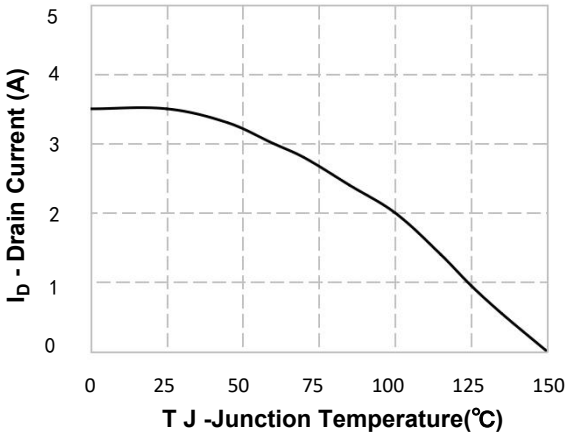


Figure 10. Maximum PContinuous Drain Currentvs Case Temperature

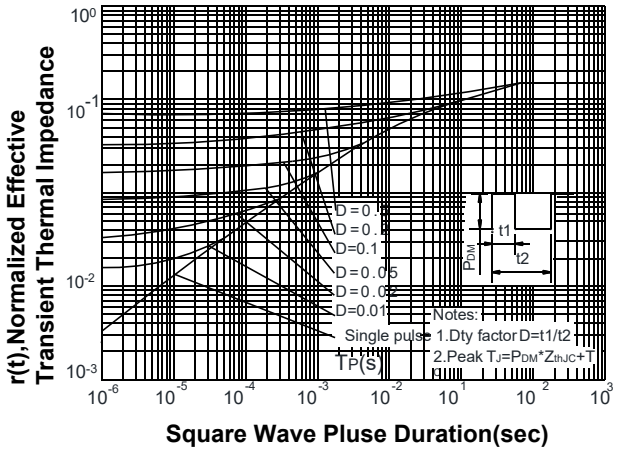
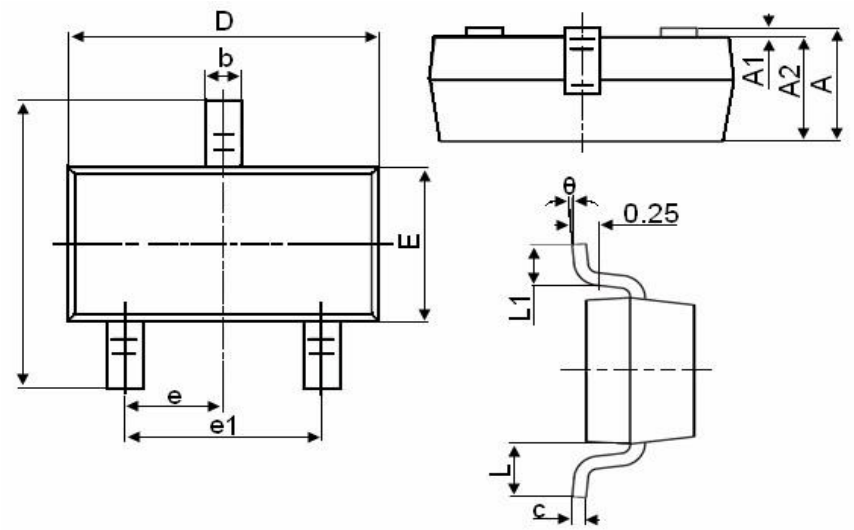


Figure 11. Transient Thermal Response Curve

Package Mechanical Data: SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°