

TF2302S N-Channel 20-V(D-S) MOSFET

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
20V	0.055Ω@4.5V	2.5A
	0.065Ω@2.5V	

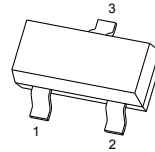
General FEATURE

- TrenchFET Power MOSFET
- Lead free product is acquired
- Surface mount package

APPLICATION

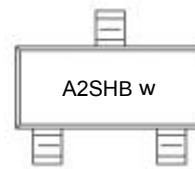
- Load Switch for Portable Devices
- DC/DC Converter

SOT-23



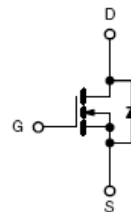
- 1.GATE
- 2.SOURCE
- 3.DRAIN

MARKING



*w: week code

Equivalent Circuit



Maximum ratings ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±12	
Continuous Drain Current	I_D	2.5	A
Pulsed Drain Current*1	I_{DM}	8	
Continuous Source-Drain Diode Current	I_S	0.6	
Maximum Power Dissipation	P_D	0.8	W
Thermal Resistance from Junction to Ambient($t \leq 5s$)	$R_{\theta JA}$	156	$^{\circ}\text{C/W}$
Junction Temperature	T_J	150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55 ~+150	

Note :

*1. Pulse Width $\leq 300\mu s$, Duty cycle $\leq 2\%$

MOSFET ELECTRICAL CHARACTERISTICS

T_a =25 °C unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Static						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =-250μA	20			V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	0.5	0.8	1.0	
Gate-source leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±10V			±100	nA
Zero gate voltage drain current	I _{DSS}	V _{DS} =16V, V _{GS} =0V			1	μA
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} =4.5V, I _D =2.5A		0.048	0.055	Ω
		V _{GS} =2.5V, I _D =1.8A		0.055	0.065	
Forward transconductance ^a	g _{fs}	V _{DS} =5V, I _D =2.5A		8.0	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{DS} =10V,V _{GS} =0V,f =1MHz		200		pF
Output capacitance	C _{oss}			100		
Reverse transfer capacitance	C _{rss}			70		
Total gate charge	Q _g	V _{DS} =10V,V _{GS} =4.5V,I _D =2.5A		4.0		nC
Gate-source charge	Q _{gs}			0.65		
Gate-drain charge	Q _{gd}			1.6		
Turn-on delay time	t _{d(on)}	V _{DD} =10V,I _D =2.5A V _{GEN} =4.5V,R _g =6Ω		15.0		ns
Rise time	t _r			85.0		
Turn-off delay time	t _{d(off)}			45.0		
Fall time	t _f			20.0		
Drain-source body diode characteristics						
Continuous source-drain diode current	I _S	T _C =25°C			1.0	A
Body diode voltage	V _{SD}	I _S =0.6A		0.7	1.3	V

Notes :

a. Pulse Test : Pulse Width < 300μs, Duty Cycle ≤ 2%.

b. Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics

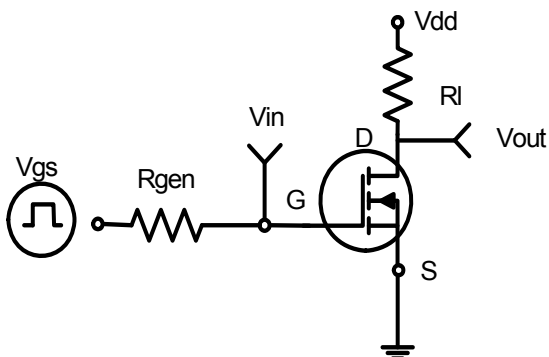


Figure 1: Switching Test Circuit

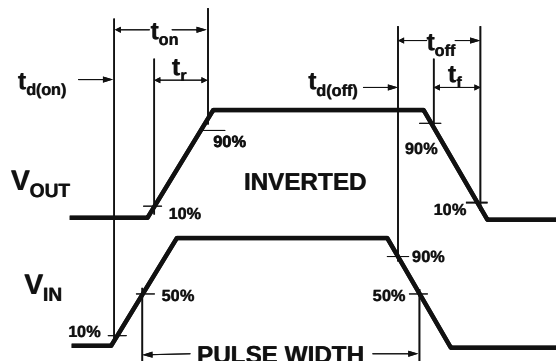
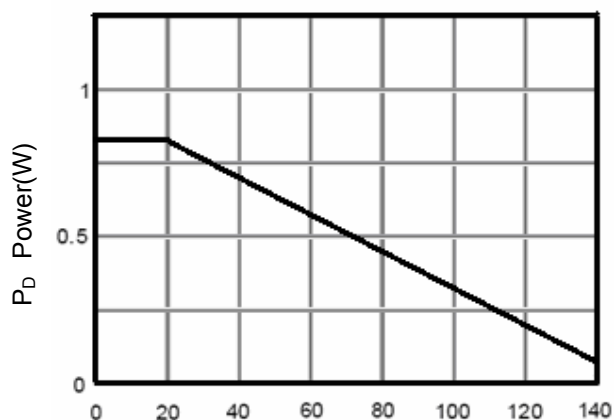
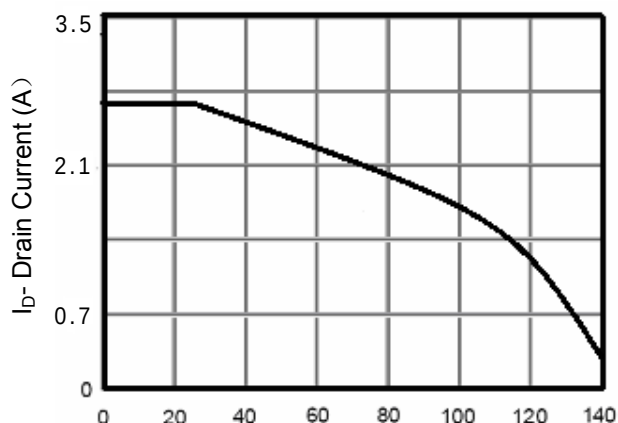


Figure 2: Switching Waveforms



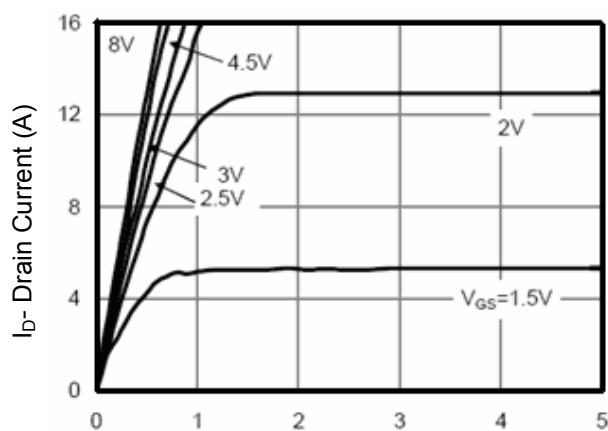
T_J-Junction Temperature(°C)

Figure 3 Power Dissipation



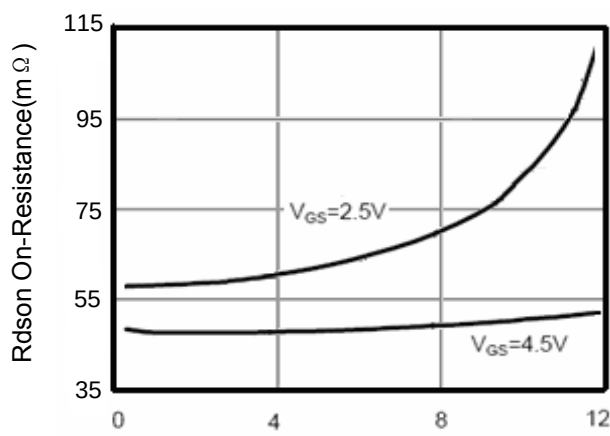
T_J-Junction Temperature(°C)

Figure 4 Drain Current



V_{ds} Drain-Source Voltage (V)

Figure 5 Output Characteristics



ID-Drain Current (A)

Figure 6 Drain-Source On-Resistance

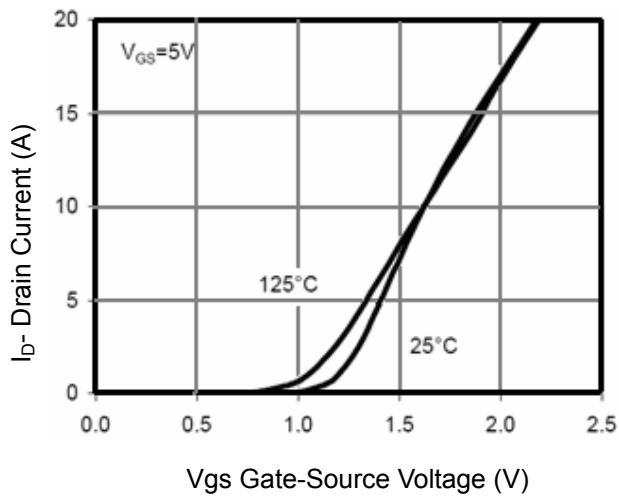


Figure 7 Transfer Characteristics

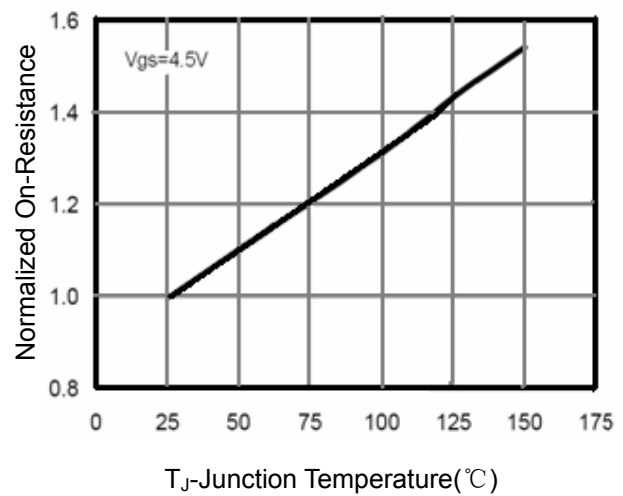


Figure 8 Drain-Source On-Resistance

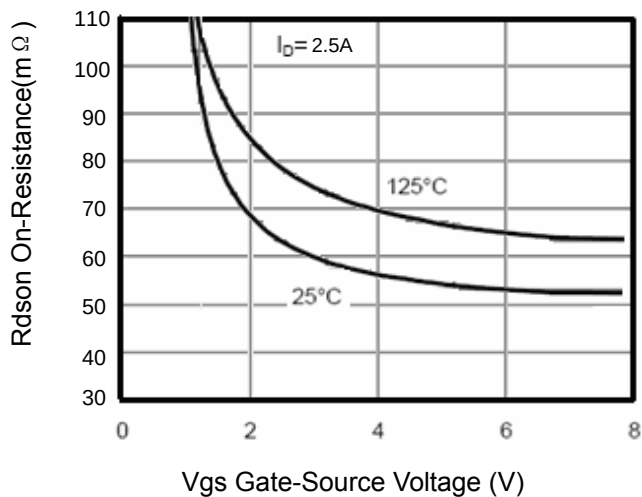


Figure 9 $R_{DS(on)}$ vs V_{GS}

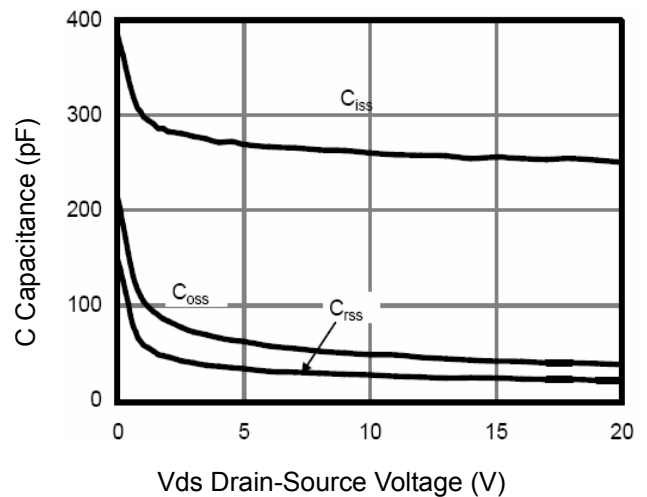


Figure 10 Capacitance vs V_{DS}

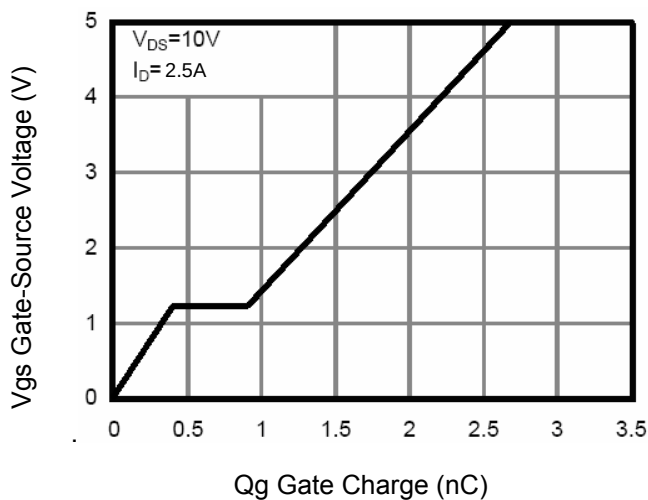


Figure 11 Gate Charge

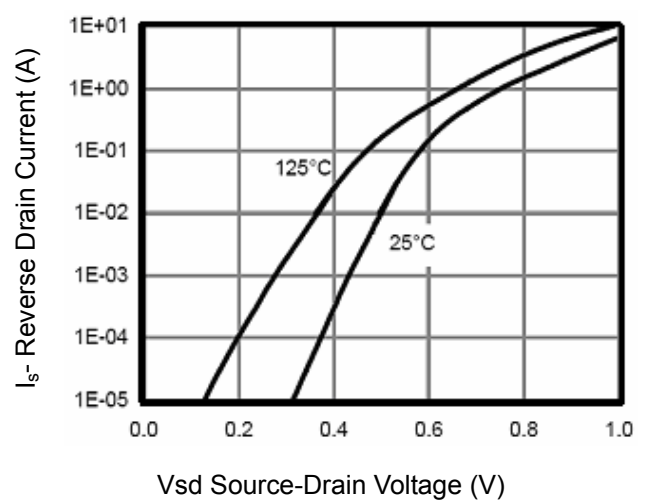


Figure 12 Source- Drain Diode Forward

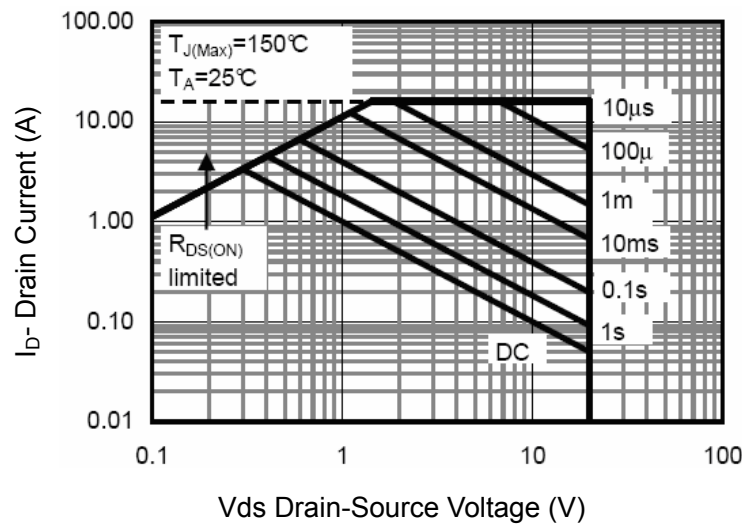


Figure 13 Safe Operation Area

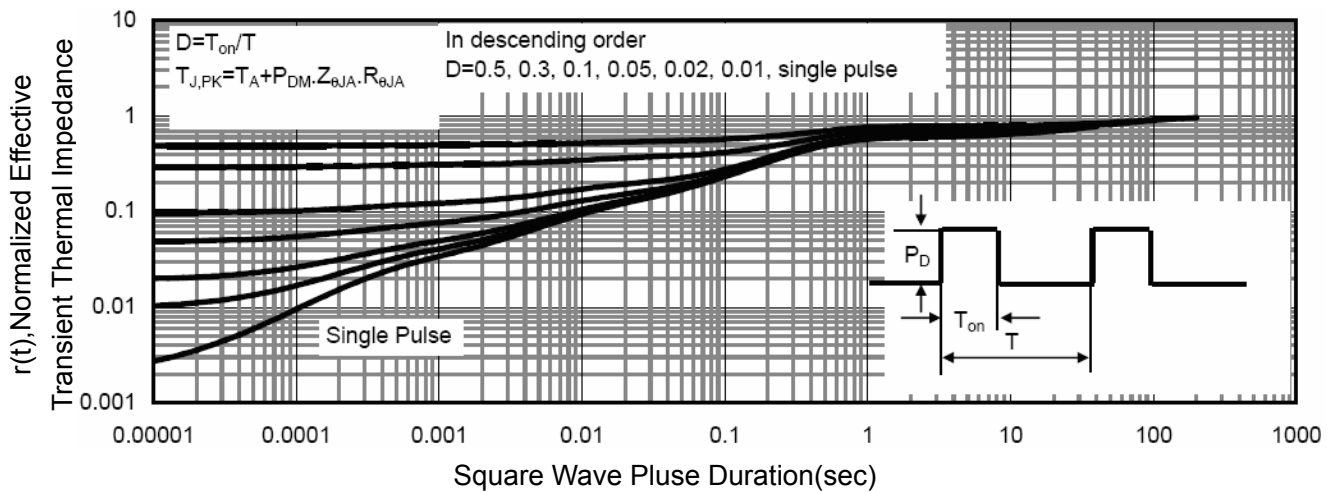
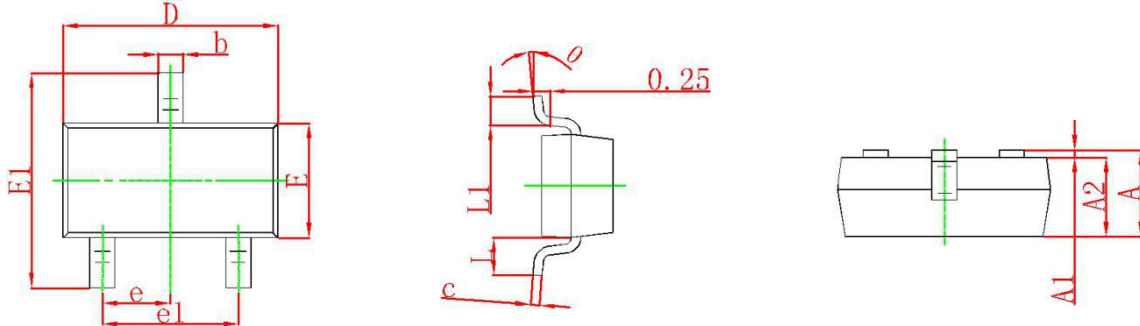


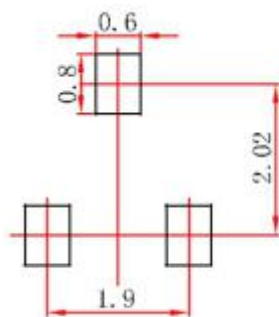
Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		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	0.080	0.150	0.003	0.006
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	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.