

Product Summary

- $V_{DS} = -20V, I_D = -4.1A$
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Application

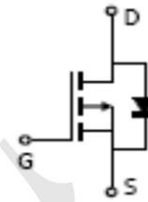
- Load/Power Switching
- Interfacing Switching
- Logic Level Shift

Package and Pin Configuration

SOT-23



Circuit diagram



Marking:



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current	I_D	$T_C = 25^\circ C$	-4.1
		$T_C = 70^\circ C$	-3.2
		$T_A = 25^\circ C$	-3
		$T_A = 70^\circ C$	-2.3
Drain Current -Pulsed (Note 1)	I_{DM}	-15	A
Maximum Power Dissipation	P_D	1.7	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	74	$^\circ C/W$
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Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Off Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-20	-	-	V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V	-	-	-1	μA	
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA	
On Characteristics (Note 3)							
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.45	-0.7	-1.0	V	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =-4.5V, I _D =-4.1A	-	39	52	mΩ	
		V _{GS} =-2.5V, I _D =-3A	-	58	75		
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-2A	6	-	-	S	
Dynamic Characteristics (Note4)							
Input Capacitance	C _{iss}	V _{DS} =-4V, V _{GS} =0V, F=1.0MHz	-	740	-	PF	
Output Capacitance	C _{oss}		-	290	-	PF	
Reverse Transfer Capacitance	C _{rss}		-	190	-	PF	
Switching Characteristics (Note 4)							
Turn-on Delay Time	t _{d(on)}	V _{DD} =-4V, I _D =-3.3A , R _L =-1.2Ω, V _{GEN} =-4.5V, R _g =1Ω	-	12	-	nS	
Turn-on Rise Time	t _r		-	35	-	nS	
Turn-Off Delay Time	t _{d(off)}		-	30	-	nS	
Turn-Off Fall Time	t _f		-	10	-	nS	
Total Gate Charge	Q _g		V _{DS} =-4V, I _D =-4.1A, V _{GS} =-4.5V	-	7.8	-	nC
Gate-Source Charge	Q _{gs}			-	1.2	-	nC
Gate-Drain Charge	Q _{gd}	-		1.6	-	nC	
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1.6A	-	-	-1.2	V	
Diode Forward Current (Note 2)	I _S		-	-	1.6	A	



Typical Electrical and Thermal Characteristics

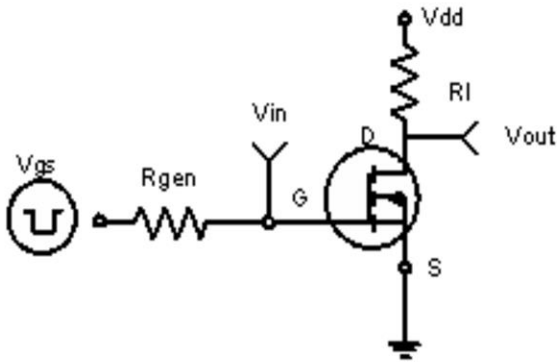


Figure 1: Switching Test Circuit

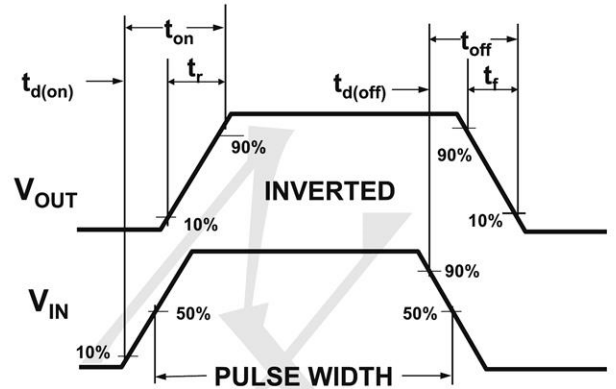
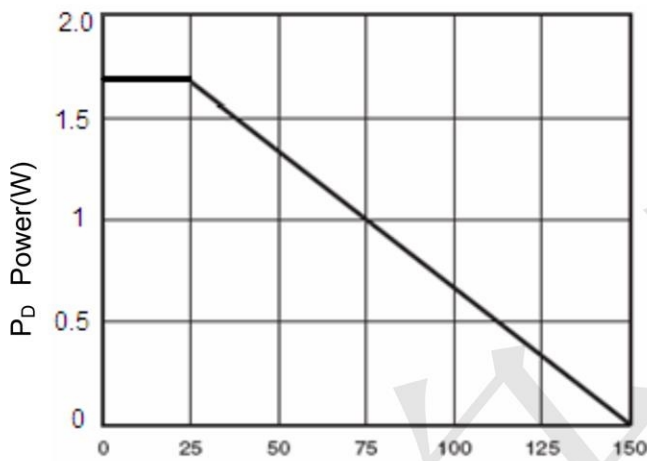
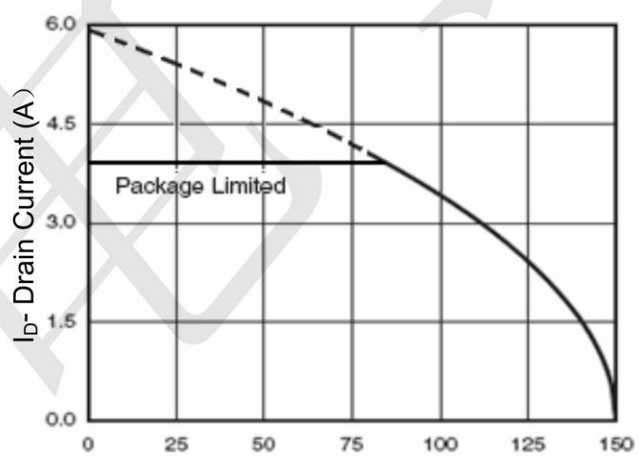


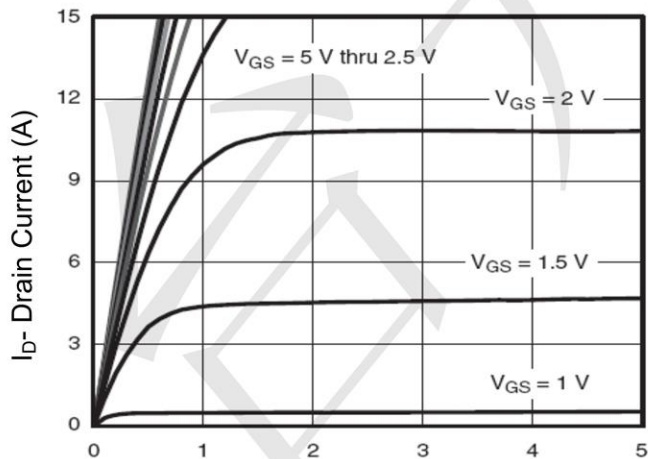
Figure 2: Switching Waveforms



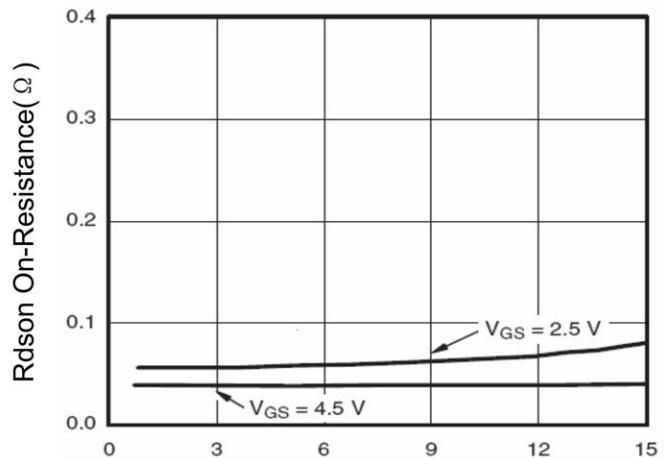
T_J-Junction Temperature(°C)
Figure 3 Power Dissipation



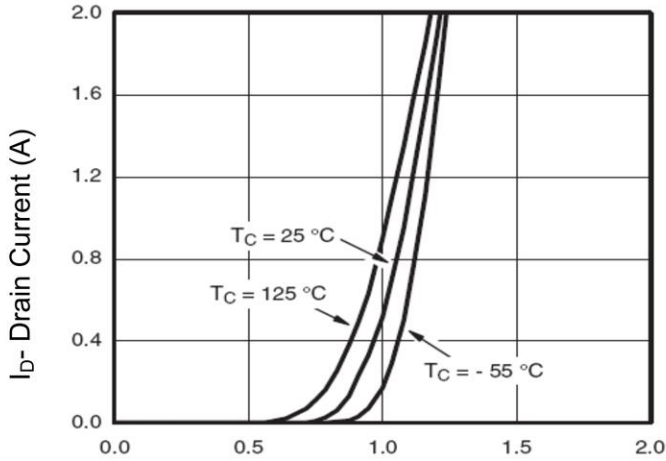
T_J-Junction Temperature(°C)
Figure 4 Drain Current



V_{ds} Drain-Source Voltage (V)
Figure 5 Output Characteristics

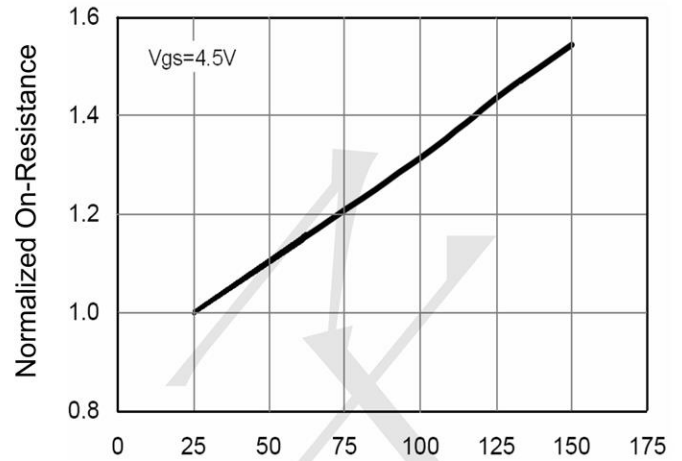


I_D- Drain Current (A)
Figure 6 Drain-Source On-Resistance



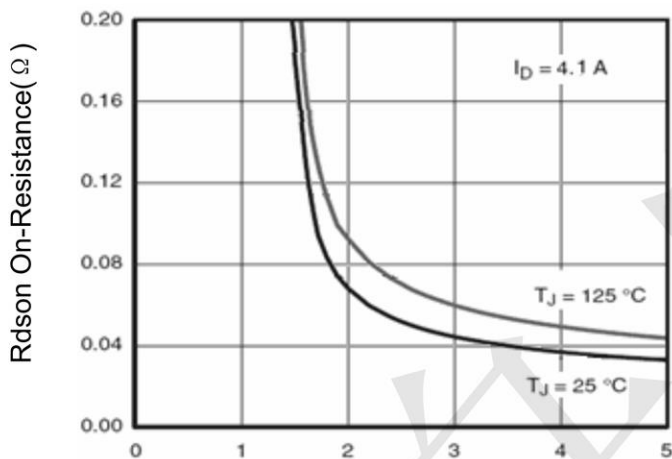
Vgs Gate-Source Voltage (V)

Figure 7 Transfer Characteristics



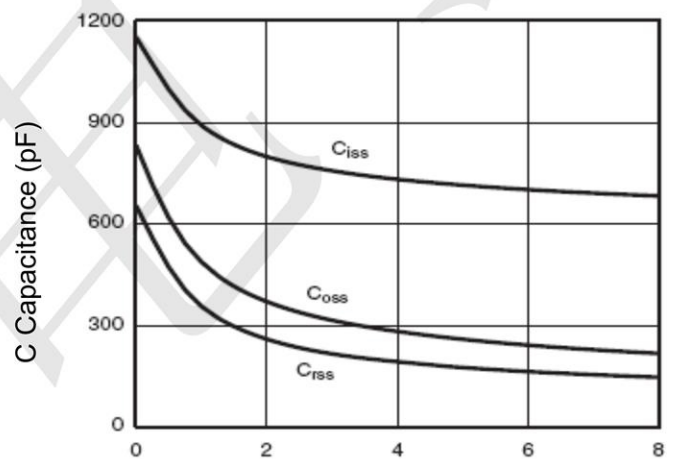
TJ-Junction Temperature($^\circ\text{C}$)

Figure 8 Drain-Source On-Resistance



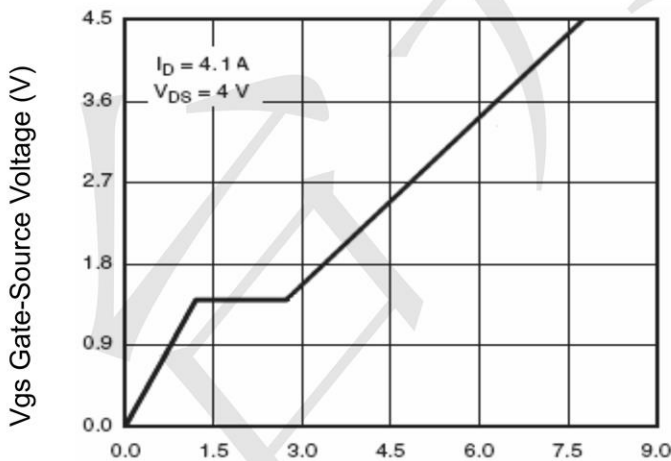
Vgs Gate-Source Voltage (V)

Figure 9 Rdson vs Vgs



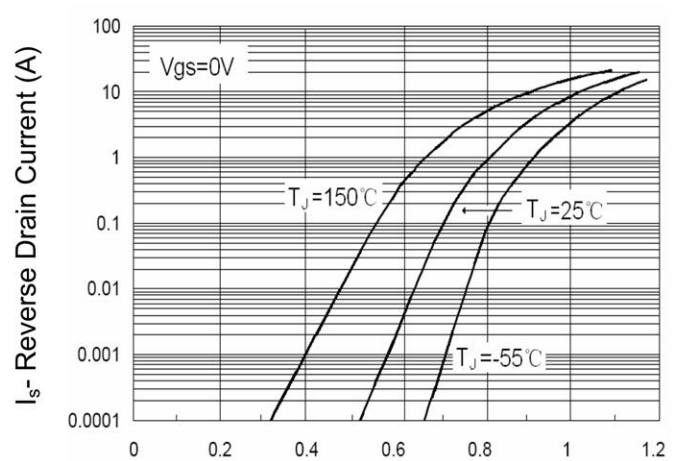
Vds Drain-Source Voltage (V)

Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)

Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)

Figure 12 Source- Drain Diode Forward

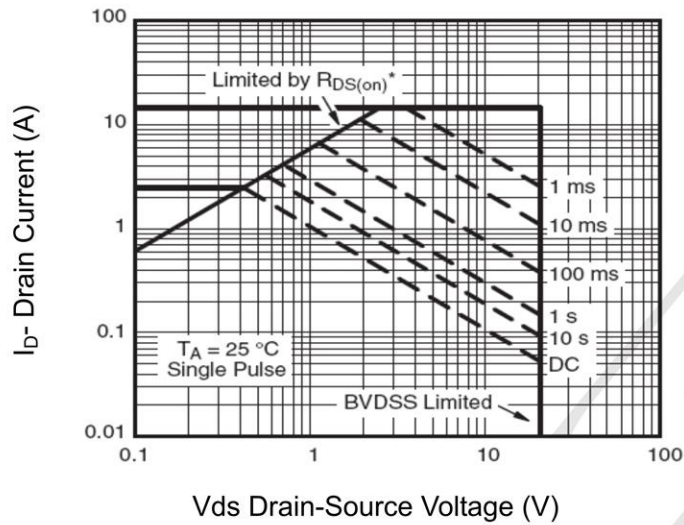


Figure 13 Safe Operation Area

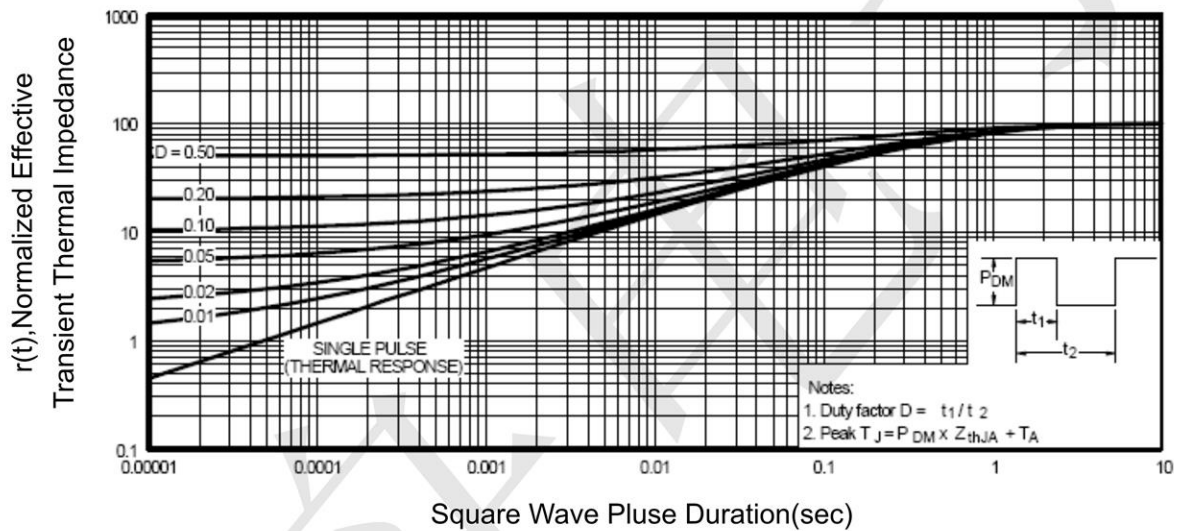
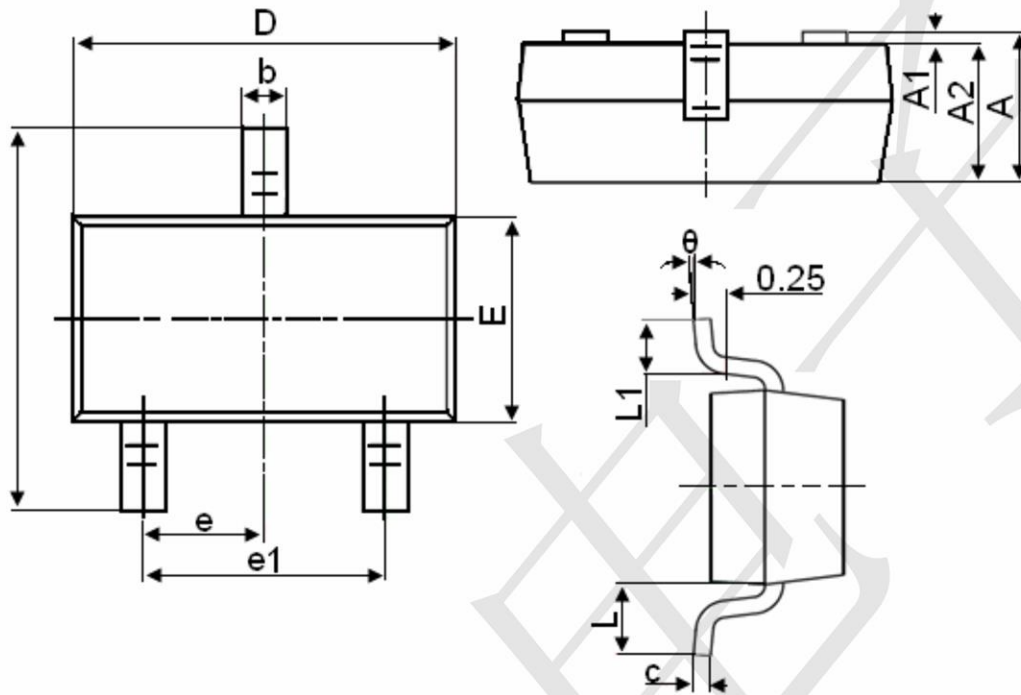


Figure 14 Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



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°

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