

250V N-Channel Depletion-Mode Power MOSFET

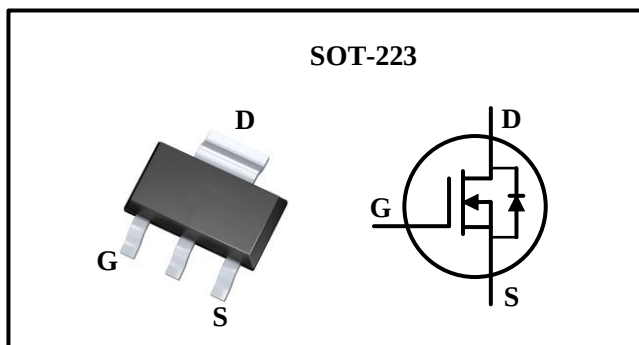
General Features

- Depletion Mode (Normally On)
- Fast Switching Speed
- High-input impedance
- RoHS Compliant
- Halogen-free Available

BV_{DSX}	$R_{DS(ON)(Max.)}$	$I_{DSS(Min.)}$
250V	6Ω	50mA

Applications

- Current Regulator
- Normally-On Switches
- Solid State Relays
- Converters
- Telecommunications
- Power Supply



Ordering Information

Part Number	Package	Marking	Remark
DMS2503	SOT-223	2503	Halogen Free

Absolute Maximum Ratings

$T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	DMS2503	Unit
V_{DSX}	Drain-to-Source Voltage ^[1]	250	V
I_D	Continuous Drain Current	0.35	A
I_{DM}	Pulsed Drain Current ^[2]	1.4	
P_D	Power Dissipation	1.5	W
V_{GS}	Gate-to-Source Voltage	±20	V
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	$^{\circ}\text{C}$
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses beyond those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

Note: The MOSFET is sensitive to electrostatic discharge. When handling this device, the worktables, operators, soldering irons and other objects should be protected against anti-static discharge.

Thermal Characteristics

Symbol	Parameter	DMS2503	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	83	$^{\circ}\text{C/W}$

Electrical Characteristics

OFF Characteristics

 $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSX}	Drain-to-Source Breakdown Voltage	250	--	--	V	$V_{GS}=-5\text{V}$, $I_D=250\mu\text{A}$
$I_{D(OFF)}$	Drain-to-Source Leakage Current	--	--	200	nA	$V_{DS}=250\text{V}$, $V_{GS}=-5\text{V}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	100	nA	$V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$
		--	--	-100		$V_{GS}=-20\text{V}$, $V_{DS}=0\text{V}$

ON Characteristics

 $T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
I_{DSS}	Saturated Drain-to-Source Current	50	--	--	mA	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	--	--	20	Ω	$V_{GS}=0\text{V}$, $I_D=25\text{mA}$ ^[3]
		--	--	6.0	Ω	$V_{GS}=10\text{V}$, $I_D=0.35\text{A}$ ^[3]
$V_{GS(off)}$	Gate-to-Source Cut-off Voltage	-2.1	--	-1	V	$V_{DS}=3\text{V}$, $I_D=400\mu\text{A}$
gfs	Forward Transconductance	--	190	--	mS	$V_{DS}=10\text{V}$, $I_D=25\text{mA}$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	328	--	pF	$V_{GS}=-5\text{V}$ $V_{DS}=25\text{V}$ $f=1.0\text{MHz}$
C_{oss}	Output Capacitance	--	30	--		
C_{rss}	Reverse Transfer Capacitance	--	3	--		
Q_g	Total Gate Charge	--	4.7	--	nC	$V_{GS}=-5\text{V}\sim 5\text{V}$ $V_{DS}=125\text{V}$ $I_D=200\text{mA}$
Q_{gs}	Gate-to-Source Charge	--	1.4	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	1.17	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	8	--	ns	$V_{GS}=-5\text{V}\sim 5\text{V}$ $V_{DD}=125\text{V}$ $I_D=200\text{mA}$ $R_G=10\Omega$
t_r	Rise Time	--	3.8	--		
$t_{d(off)}$	Turn-off Delay Time	--	22.4	--		
t_f	Fall Time	--	97	--		



Source-Drain Diode Characteristics

$T_A=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_{SD}=0.35\text{A}$, $V_{GS}=-3\text{V}$

NOTE:

[1] $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$.

[2] Repetitive rating, pulse width limited by maximum junction temperature.

[3] Pulse width $\leq 380\mu\text{s}$, duty cycle $\leq 2\%$.

Typical Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

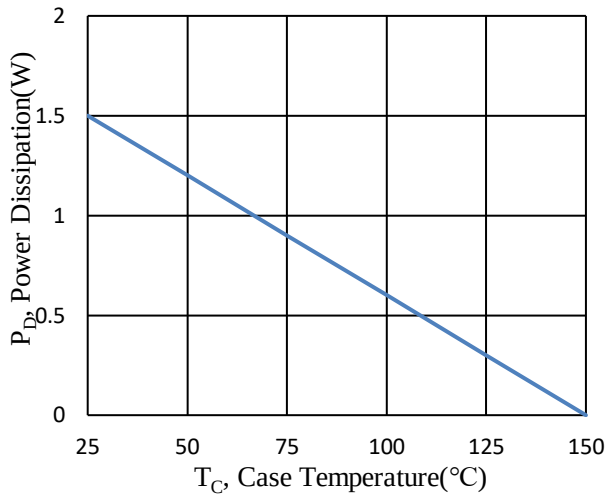


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

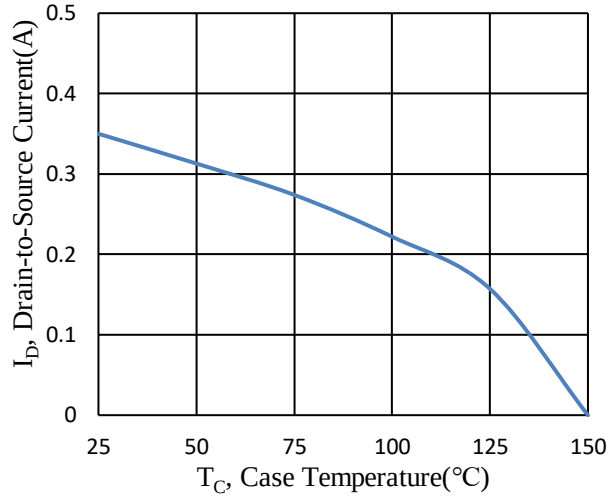


Figure 3. Typical Output Characteristics

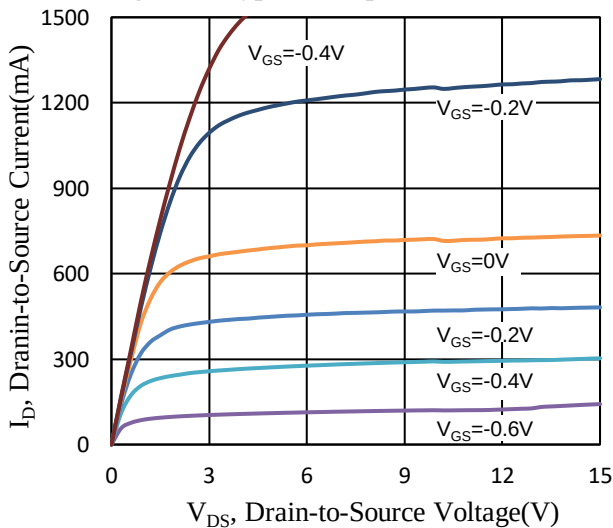


Figure 4. Typical Transfer Characteristics

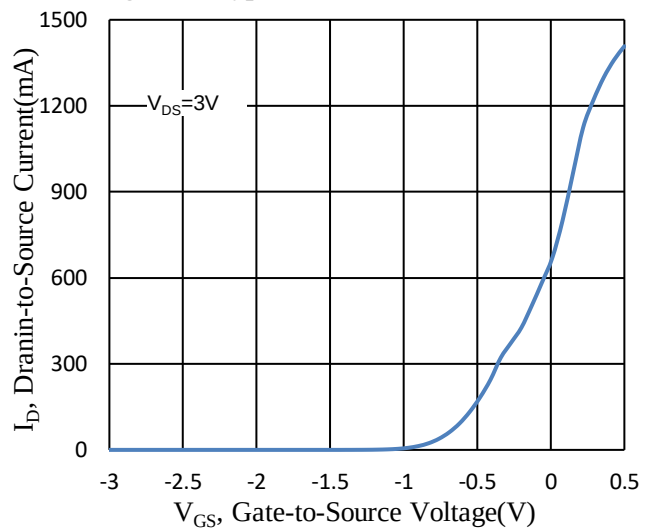


Figure 5. Typical Capacitance vs. Drain-to-Source Voltage

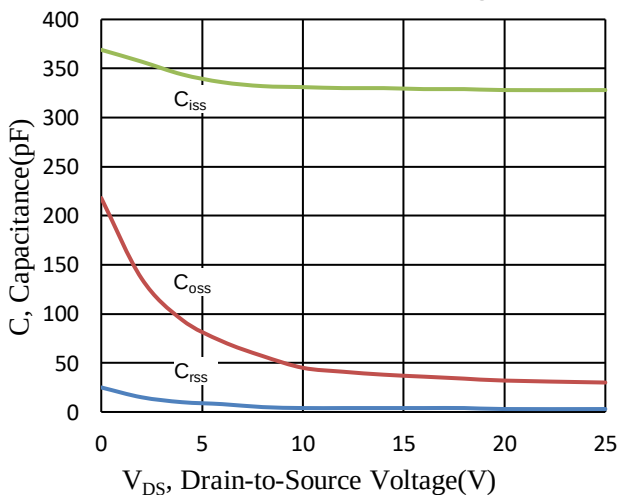


Figure 6. Typical Gate Charge vs. Gate-to-Source Voltage

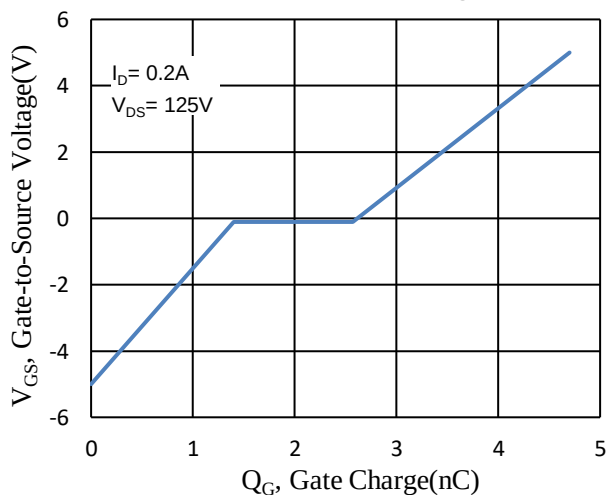


Figure 7. Threshold Voltage vs. Temperature

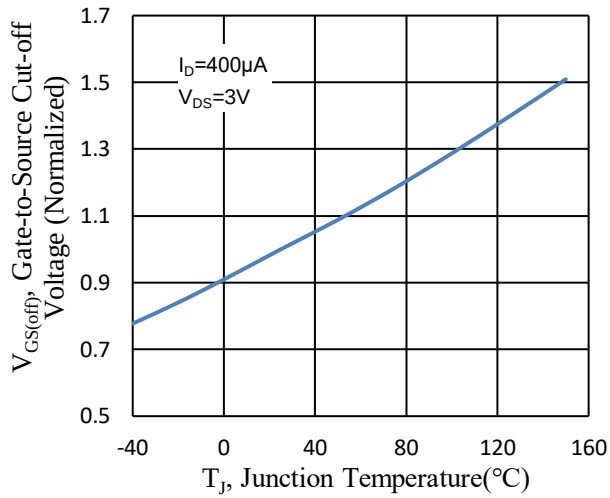


Figure 8. Normalized On-Resistance vs. Junction Temperature

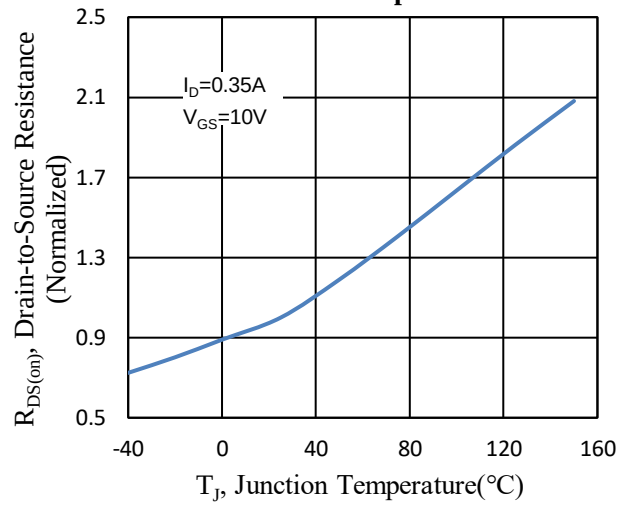


Figure 9. Drain-to-Source Breakdown Voltage vs. Junction Temperature

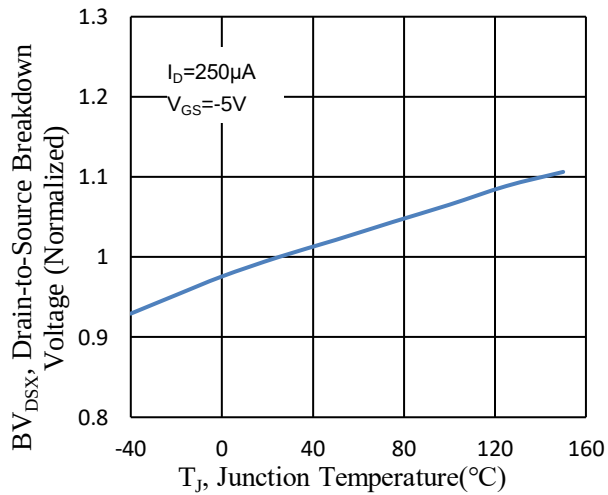
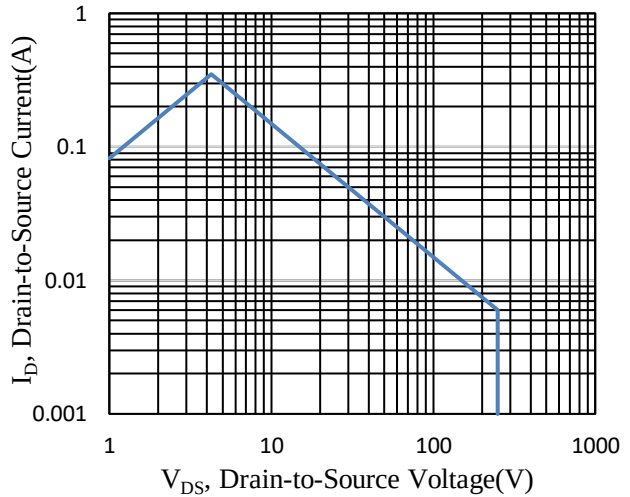
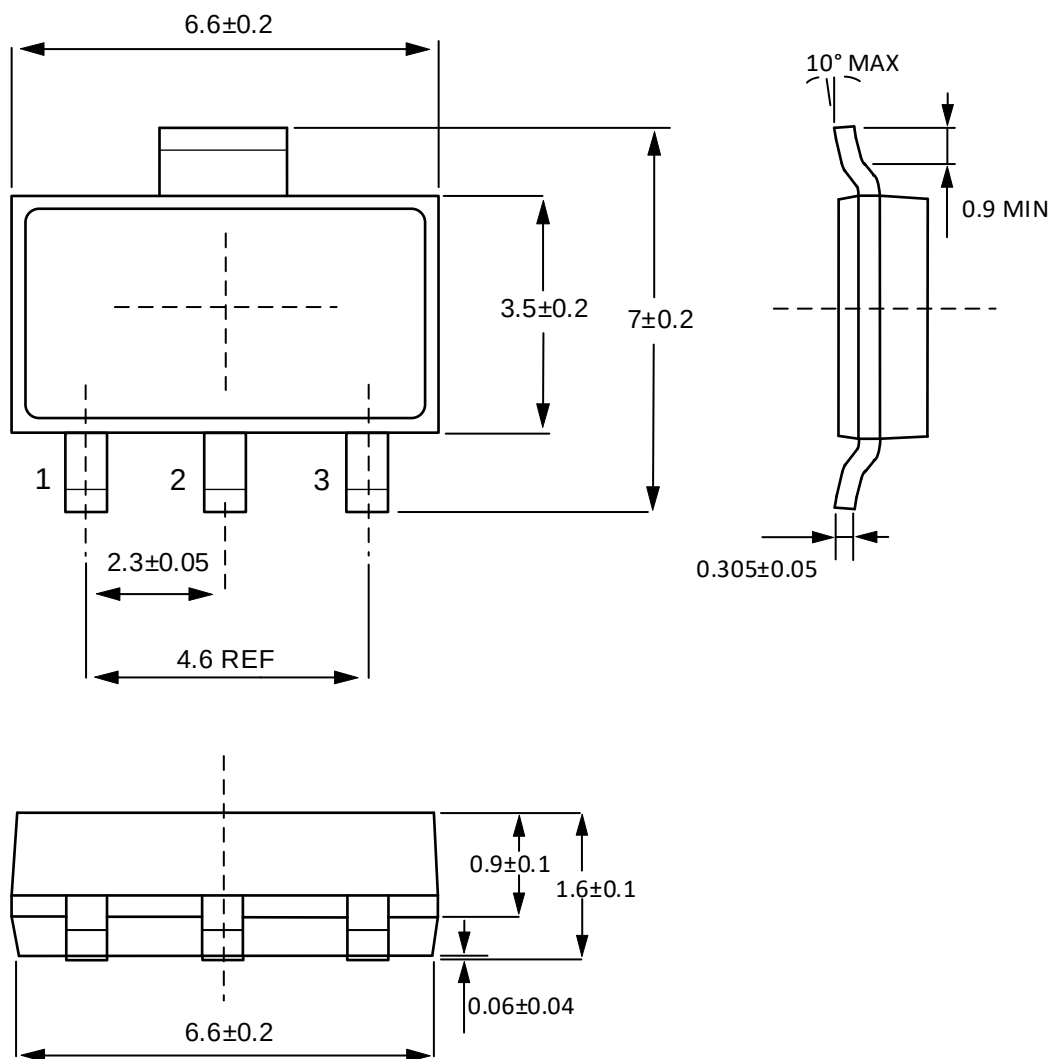


Figure 10. Maximum Forward Safe Operating Area



Package Dimensions

SOT-223





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