

600V N-Channel Depletion-Mode Power MOSFET

General Features

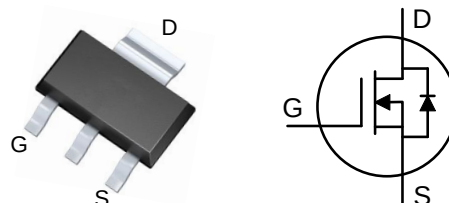
- Depletion Mode (Normally On)
- Proprietary Advanced Planar Technology
- Rugged Polysilicon Gate Cell Structure
- Fast Switching Speed
- RoHS Compliant
- Halogen-free Available

BV_{DSX}	$R_{DS(ON)}$ (Typ.)	I_{DSS} (Min.)
600V	4Ω	1A

SOT-223

Applications

- New Energy Vehicles
- Industrial Automation
- Surge Protection
- Non-isolated Linear Power Supply
- Normally-on Switches
- Linear Amplifier
- Constant Current Source
- Telecom



Ordering Information

Part Number	Package	Marking	Remark
DMS04R60A	SOT-223	04R60	Halogen Free

Absolute Maximum Ratings

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

Symbol	Parameter	DMS04R60A	Unit
V_{DSX}	Drain-to-Source Voltage ^[1]	600	V
V_{DGX}	Drain-to-Gate Voltage ^[1]	600	V
I_D	Continuous Drain Current ^[2]	0.4	A
I_{DM}	Pulsed Drain Current	1.6	
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	°C
T_J and T_{STG}	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	DMS04R60A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	83	K/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	600	--	--	V	$V_{GS} = -10\text{V}$, $I_D = 250\mu\text{A}$
$I_{D(OFF)}$	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS} = 600\text{V}$, $V_{GS} = -10\text{V}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	500	nA	$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$
		--	--	-500		$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$

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	1	--	--	A	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	4	8	Ω	$V_{GS} = 0\text{V}$, $I_D = 400\text{mA}^{[3]}$
$V_{GS(OFF)}$	Gate-to-Source Cut-off Voltage	-4.5	--	-1.5	V	$V_{DS} = 3\text{V}$, $I_D = 8\mu\text{A}$
gfs	Forward Transconductance	--	1.2	--	S	$V_{DS} = 20\text{V}$, $I_D = 400\text{mA}$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	495	--	pF	$V_{GS} = -10\text{V}$ $V_{DS} = 25\text{V}$ $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	--	33	--		
C_{rss}	Reverse Transfer Capacitance	--	4.5	--		
Q_g	Total Gate Charge	--	14.4	--	nC	$V_{GS} = -10\text{V} \sim 5\text{V}$ $V_{DD} = 120\text{V}$ $I_D = 400\text{mA}$
Q_{gs}	Gate-to-Source Charge	--	5.4	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	2.7	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	17.6	--	ns	$V_{GS} = -10\text{V} \sim 5\text{V}$ $V_{DD} = 120\text{V}$ $I_D = 400\text{mA}$ $R_G = 10\Omega$
t_{rise}	Rise Time	--	6.0	--		
$t_{d(off)}$	Turn-off Delay Time	--	29.2	--		
t_{fall}	Fall Time	--	30.0	--		



Source-Drain Diode Characteristics

T_A=25°C unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Units	Test Conditions
V _{SD}	Diode Forward Voltage	--	--	1.5	V	I _{SD} =400mA, V _{GS} =-5V

NOTE:

[1] T_J=+25°C to +150°C

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

[3] Pulse width≤380μs; duty cycle≤2%.

Typical Performance Characteristics

Figure 1. Maximum Power Dissipation vs. Case Temperature

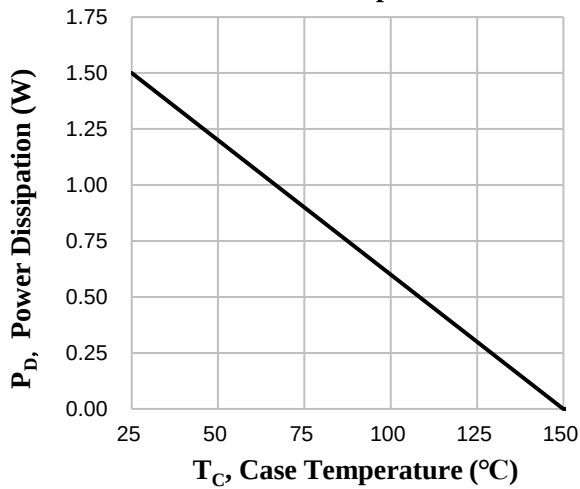


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

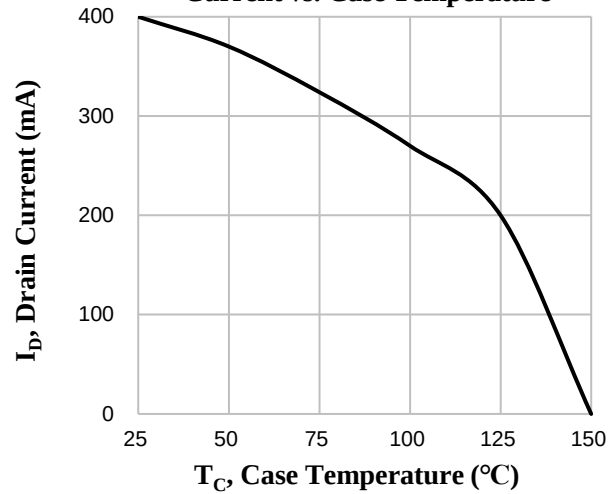


Figure 3. Typical Output Characteristics

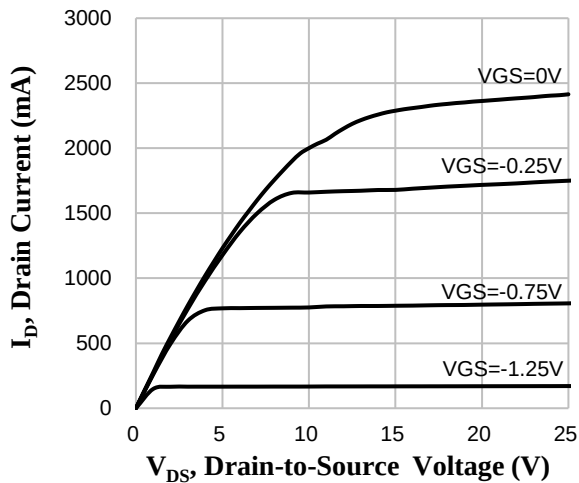


Figure 4. Typical Transfer Characteristics

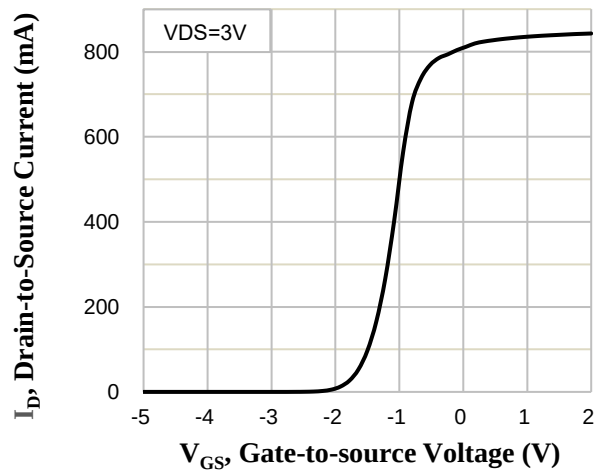


Figure 5. Typical Capacitance vs. Drain-to-Source Voltage

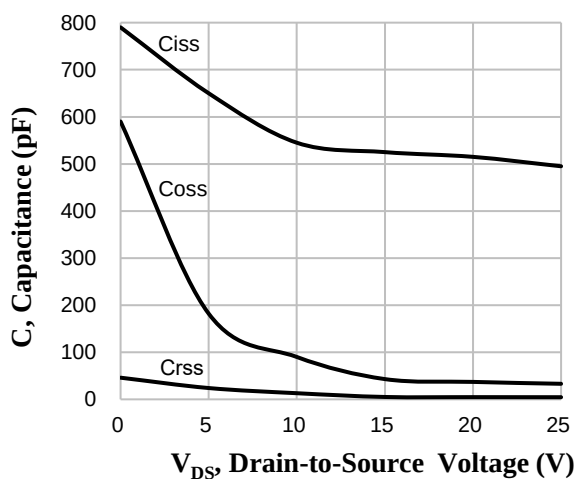
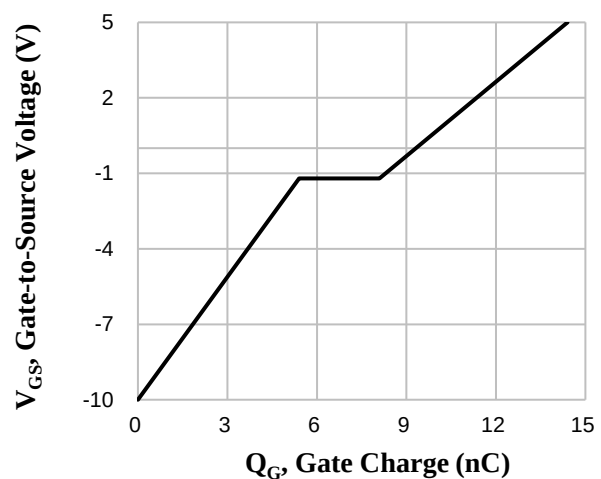
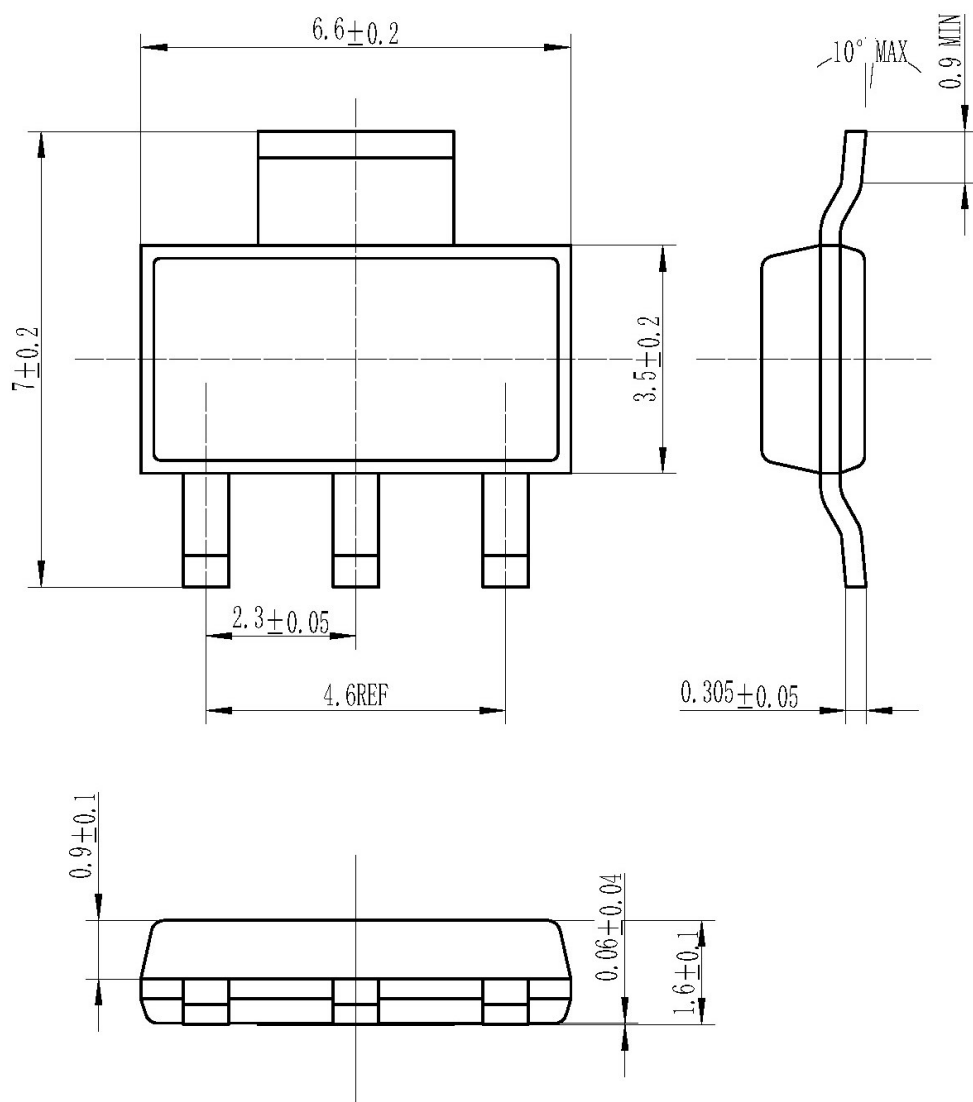


Figure 6. Typical Gate Charge vs. Gate-to-Source Voltage



Package Dimensions

SOT-223





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ARK Microelectronics Co., Ltd.
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