

600V N-Channel Depletion-Mode Power MOSFET

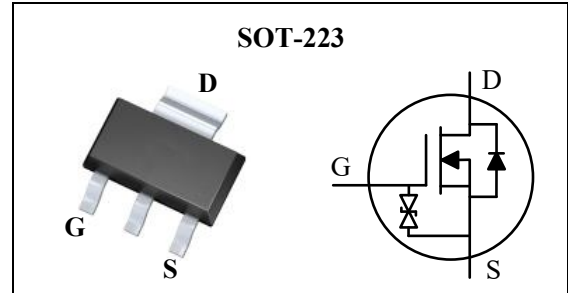
General Features

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

BV_{DSX}	$R_{DS(on)(Max.)}$	$I_{DSS(Min.)}$
600V	60Ω	100mA

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
DMS60R60A	SOT-223	60R60	Halogen Free

Absolute Maximum Ratings

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

Symbol	Parameter	DMS60R60A	Unit
V_{DSX}	Drain-to-Source Voltage ^[1]	600	V
V_{DGX}	Drain-to-Gate Voltage ^[1]	600	V
V_{GS}	Gate-to-Source Voltage	±20	V
I_D	Continuous Drain Current ^[2]	0.1	A
I_{DM}	Pulsed Drain Current ^[3]	0.4	A
P_D	Power Dissipation ^[4]	1.5	W
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300	°C
T_J & T_{STG}	Operating and Storage Temperature Range	-55 to 150	°C

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

Thermal Characteristics

Symbol	Parameter	DMS60R60A	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	83	°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	600	--	--	V	$V_{GS} = -10\text{V}$, $I_D = 250\mu\text{A}$
$I_{D(off)}$	Drain-to-Source Leakage Current	--	--	10	μA	$V_{DS} = 600\text{V}$, $V_{GS} = -10\text{V}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	20	μA	$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$
		--	--	-20		$V_{GS} = -20\text{V}$, $V_{DS} = 0\text{V}$

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	100	--	--	mA	$V_{DS} = 25\text{V}$, $V_{GS} = 0\text{V}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	--	40	60	Ω	$V_{GS} = 0\text{V}$, $I_D = 100\text{mA}$ [5]
$V_{GS(off)}$	Gate-to-Source Cut-off Voltage	-4	--	-1.5	V	$V_{DS} = 3\text{V}$, $I_D = 8\mu\text{A}$
g_{fs}	Forward Transconductance	--	130	--	mS	$V_{DS} = 10\text{V}$, $I_D = 50\text{mA}$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	64.8	--	pF	$V_{GS} = -10\text{V}$, $V_{DS} = 25\text{V}$, $f = 1.0\text{MHz}$
C_{oss}	Output Capacitance	--	13	--		
C_{rss}	Reverse Transfer Capacitance	--	3.55	--		
Q_g	Total Gate Charge	--	1.87	--	nC	$V_{GS} = -5$ to 5V , $V_{DD} = 100\text{V}$, $I_D = 100\text{mA}$
Q_{gs}	Gate-to-Source Charge	--	0.38	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	0.69	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time	--	4.2	--	ns	$V_{GS} = -5$ to 5V , $V_{DD} = 100\text{V}$, $I_D = 100\text{mA}$, $R_G = 6\Omega$
t_r	Rise Time	--	6	--		
$t_{d(off)}$	Turn-off Delay Time	--	14.4	--		
t_f	Fall Time	--	108	--		



DMS60R60A

Provisional Datasheet

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	$I_{SD} = 100\text{mA}$, $V_{GS} = -10\text{V}$

NOTE:

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

[2] $T_j = +25^{\circ}\text{C}$.

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

[4] $T_j = +25^{\circ}\text{C}$.

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

Typical Characteristics

Figure 1. Maximum Power dissipation vs. Case Temperature

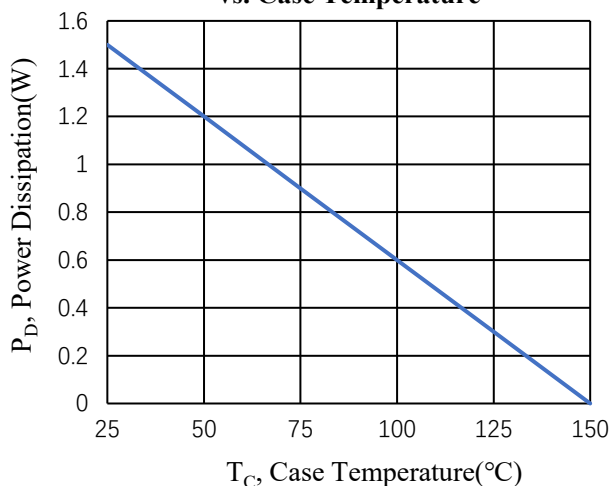


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

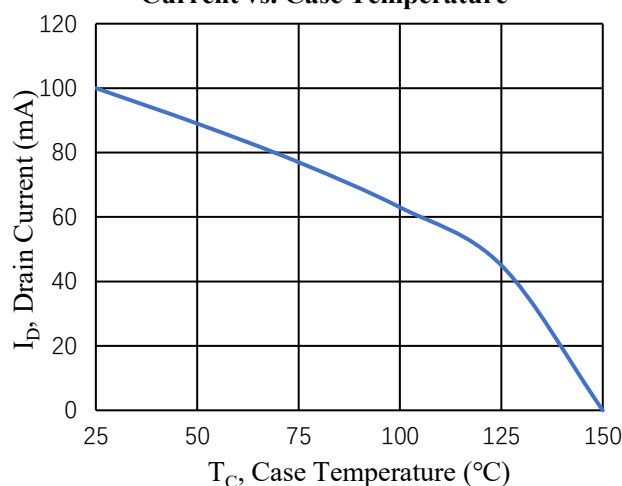


Figure 3. Typical Output Characteristics

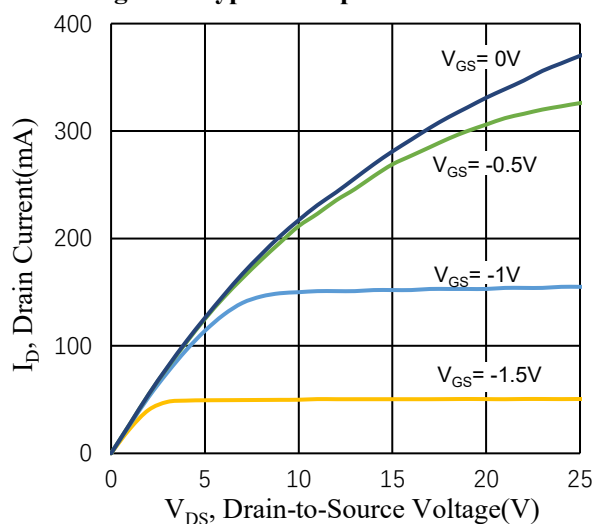


Figure 4. Typical Transfer Characteristics

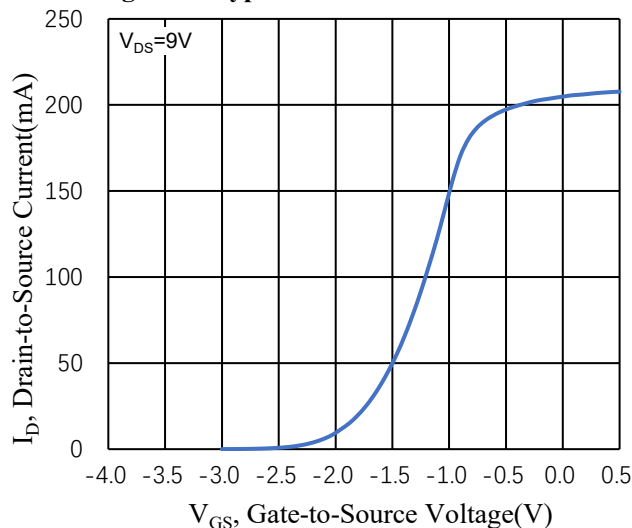


Figure 5. Typical Capacitance vs. Drain to-Source Voltage

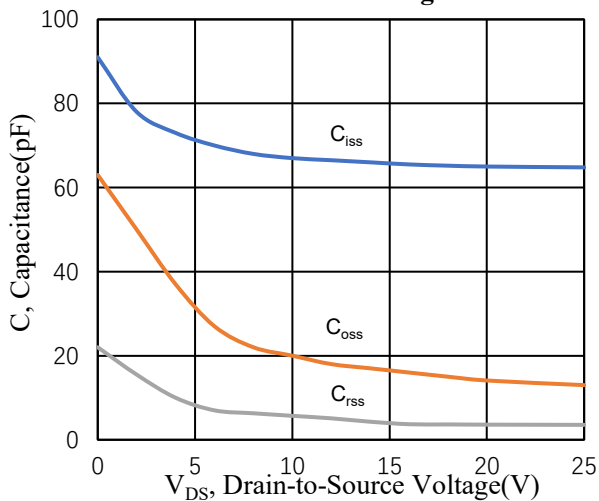


Figure 6. Typical Gate Charge vs. Gate-to-Source Voltage

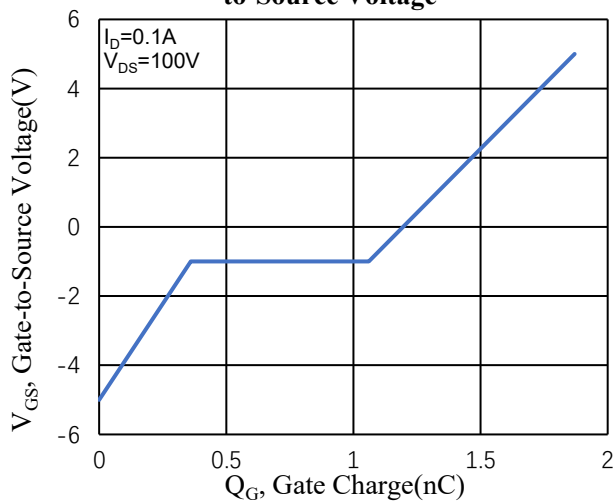


Figure 7. Normalized On-Resistance vs. Junction Temperature

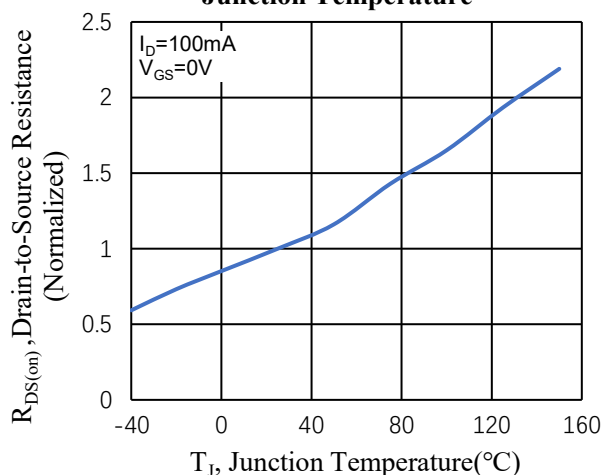


Figure 8. Gate-to-Source Cut-off Voltage vs. Junction Temperature

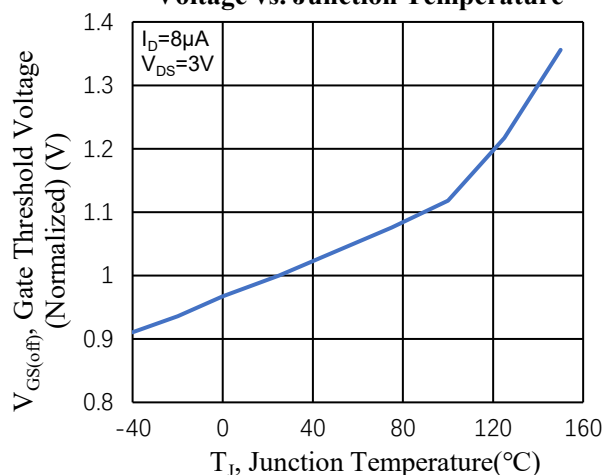


Figure 9. Drain-to-Source Breakdown Voltage vs. Junction Temperature

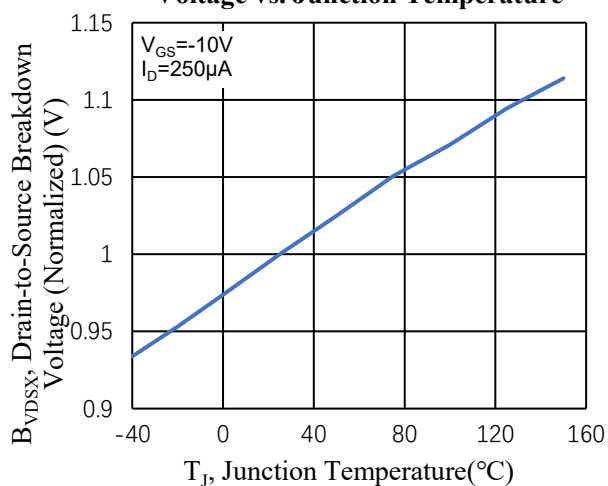
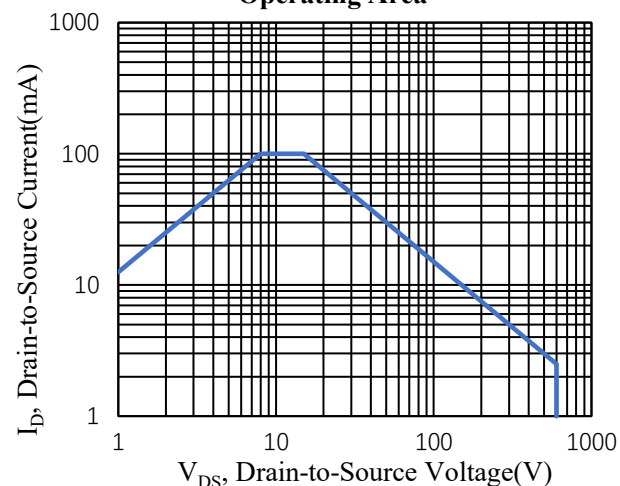
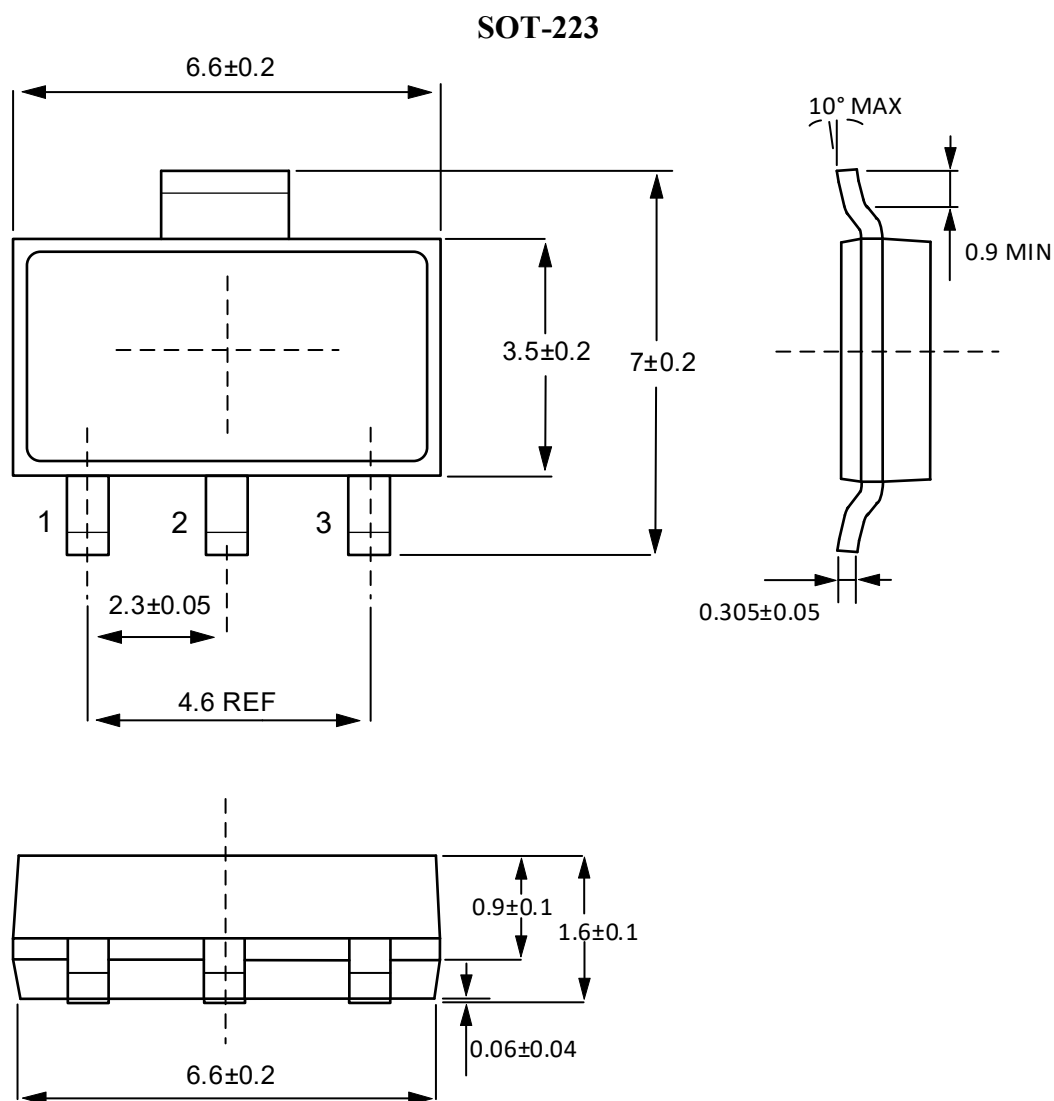


Figure 10. Maximum Forward Safe Operating Area



Package Dimensions





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ARK Microelectronics Co., Ltd.
Add: D26, UESTC National Science Park, No. 1 Shuangxing Avenue, Chengdu, Sichuan
Tel: +86 (028) 8523-2215 Email: sales@ark-micro.com Website: www.ark-micro.com
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