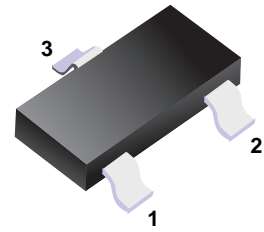


■ P-Channel Power MOSFET



- 1. Gate
- 2. Source
- 3. Drain

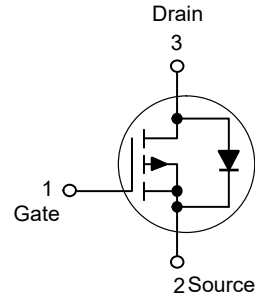
■ Features

- $V_{DS} = -60V$ $I_D = -2.0A$
- $R_{DS(ON)} = 200m\Omega(max) @ -10V$
- Halogen and Antimony Free

■ Applications

- Load Switch and in PWM Applications
- Power Management

■ Simplified outline(SOT-23)



■ Marking Code:MS09

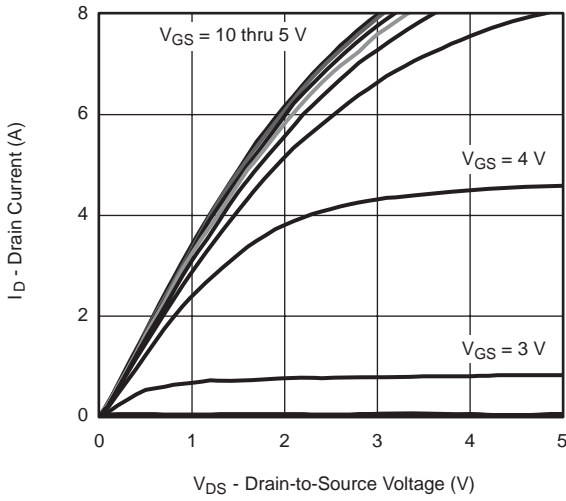
■ Absolute Maximum Ratings $T_a = 25^\circ C$

Parameter	Symbol	Value	Units
Drain-Source Voltage	$-V_{DS}$	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	$-I_D$	2	A
Power Dissipation	P_D	0.9	W
Junction and Storage Temperature Range	T_J, T_{STG}	150, -55 to 150	$^\circ C$
Thermal Characteristics			
Parameter	Symbol	Typ.	Units
Maximum Junction-to-Ambient ^{Note1}	$R_{\theta JA}$	139	$^\circ C/W$

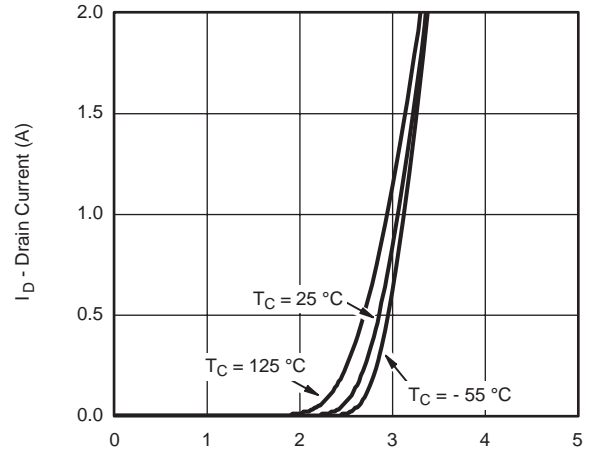
■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Static Characteristics						
Drain-source breakdown voltage	$-V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	60	--	--	V
Drain to Source Leakage Current	$-I_{DSS}$	$V_{DS} = -60V, V_{GS} = 0V$	--	--	1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	--	--	± 100	nA
Gate threshold voltage ^{Note2}	$-V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	1.5	--	3	V
Drain-source on-resistance ^{Note2}	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -2A$	--	--	200	m Ω
		$V_{GS} = -4.5V, I_D = -1A$	--	--	400	m Ω
Forward transconductance ^{Note2}	g_{FS}	$V_{DS} = -5V, I_D = -2A$	--	6	--	S
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -30V, V_{GS} = 0V, f = 1MHz$	--	850	--	pF
Output Capacitance	C_{oss}		--	65	--	
Reverse Transfer Capacitance	C_{rss}		--	28	--	
Switching Characteristics						
Turn-on delay time	$t_{d(on)}$	$I_D = -1A, V_{DD} = -30V,$ $V_{GS} = -10V, R_{GEN} = 3\Omega,$ $R_L = 7.5\Omega,$	--	7	--	ns
Turn-on rise time	t_r		--	3	--	
Turn-off delay time	$t_{d(off)}$		--	28	--	
Turn-off fall time	t_f		--	5.5	--	
Total gate charge	Q_g	$V_{DD} = -30V, V_{GS} = -10V, I_D = -2A$	--	22	--	nC
Gate-source charge	Q_{gs}		--	2.5	--	
Gate-drain charge	Q_{gd}		--	6	--	
Source-Drain Diode characteristics						
Continuous Source-Drain Diode Current	$-I_S$		--	--	1.4	A
Diode Forward voltage	$-V_{DS}$	$V_{GS} = 0V, I_S = -2A$	--	--	1.2	V

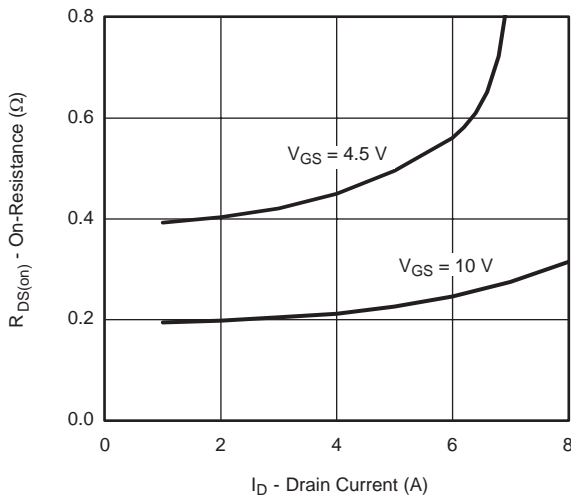
Notes: 1. Surface mounted on FR4 board, $t \leq 10$ sec.
 2. Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.



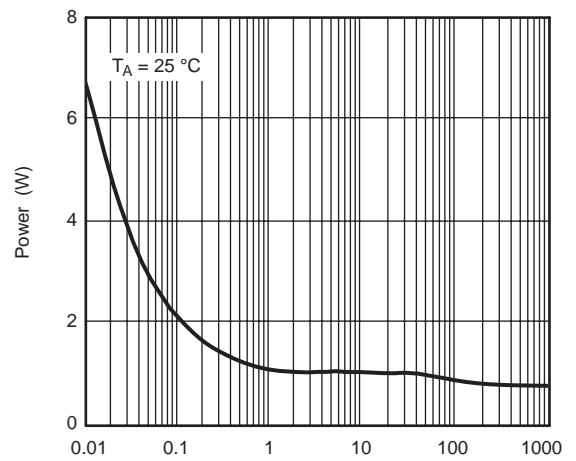
Output Characteristics



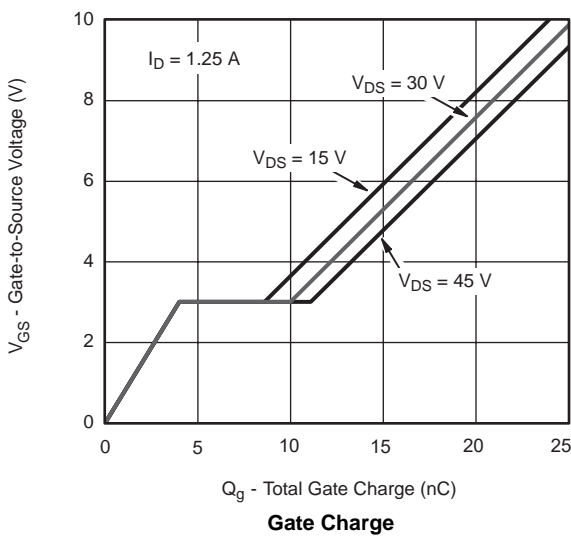
Transfer Characteristics



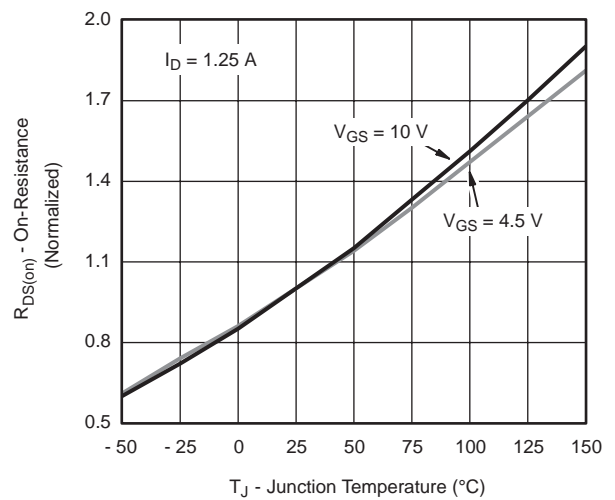
On-Resistance vs. Drain Current and Gate Voltage



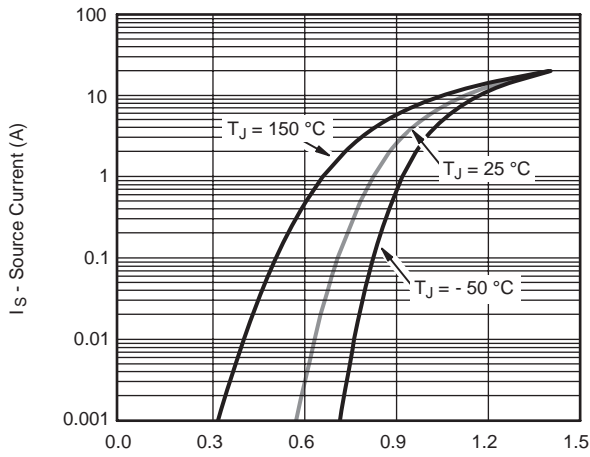
Single Pulse Power, Junction-to-Ambient



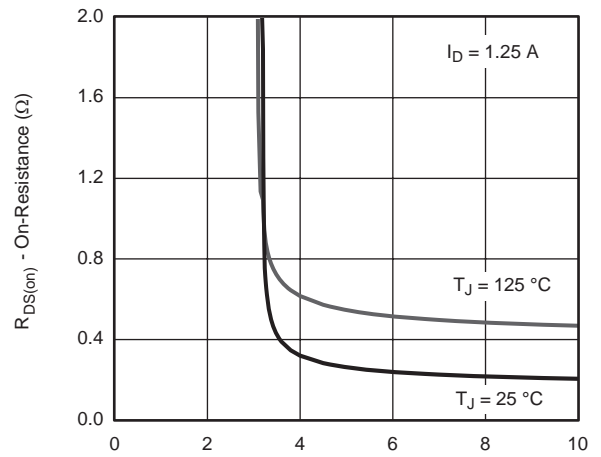
Gate Charge



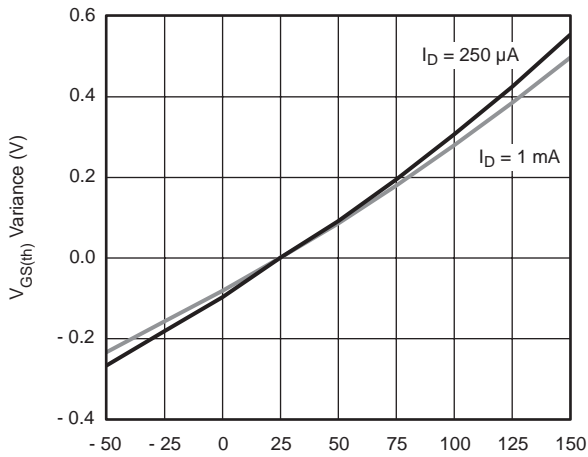
On-Resistance vs. Junction Temperature



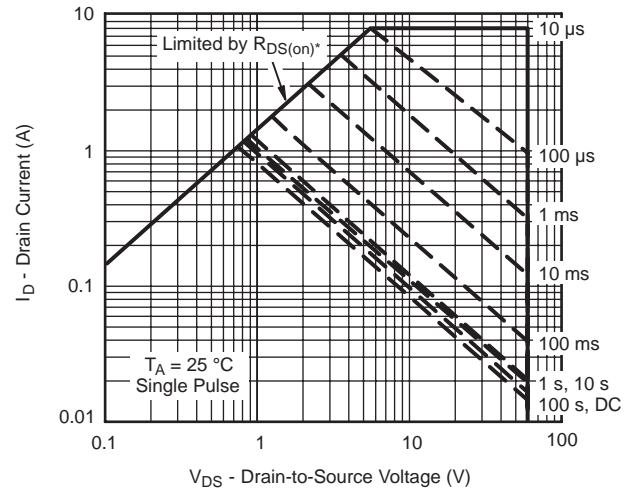
Source-Drain Diode Forward Voltage



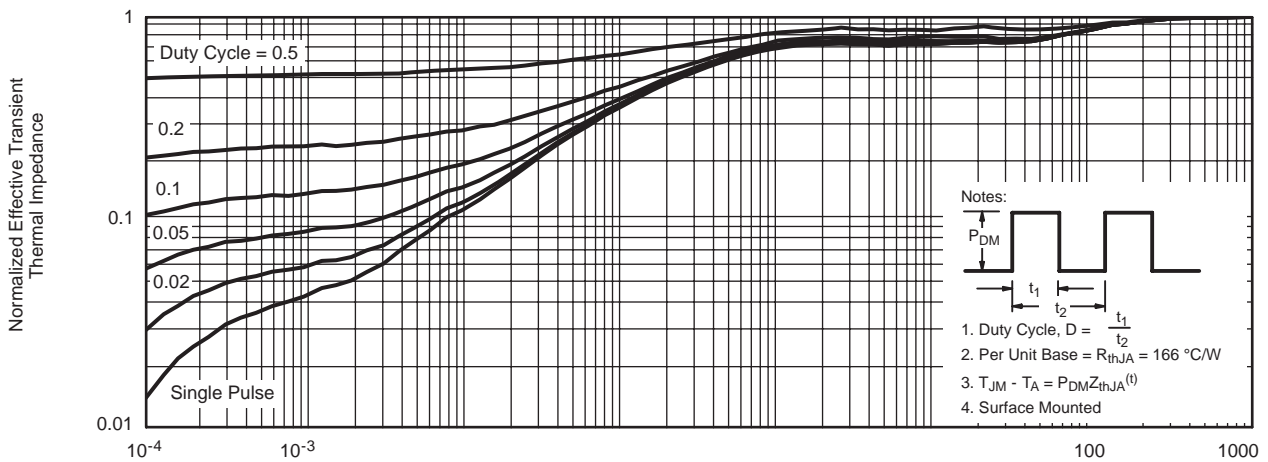
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Safe Operating Area, Junction-to-Ambient

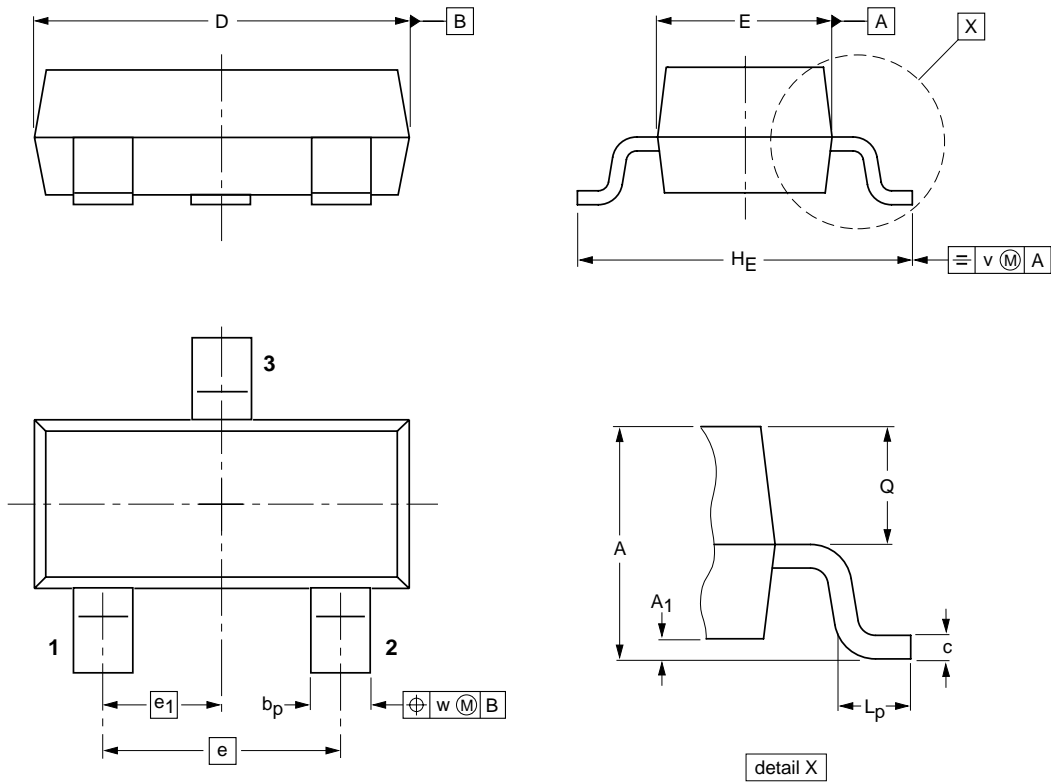


Normalized Thermal Transient Impedance, Junction-to-Ambient

- Notes:
- Duty Cycle, $D = \frac{t_1}{t_2}$
 - Per Unit Base = $R_{thJA} = 166 \text{ } ^\circ\text{C/W}$
 - $T_{JM} - T_A = P_{DM}Z_{thJA}^{(t)}$
 - Surface Mounted

Package Outline

SOT-23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max.	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

Summary of Packing Options

Package	Packing Description	Packing Quantity	Industry Standard
SOT-23	Tape/Reel, 7" reel	3000	EIA-481-1