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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





Micro Commercial Components

Micro Commercial Components  
20736 Marilla Street Chatsworth  
CA 91311  
Phone: (818) 701-4933  
Fax: (818) 701-4939

# MCQ4559

## Features

- Halogen free available upon request by adding suffix "-HF"
- Lead Free Finish/Rohs Compliant ("P" Suffix designates RoHS Compliant. See ordering information)
- Epoxy meets UL 94 V-0 flammability rating
- Moisture Sensitivity Level 1
- Marking: Q4559

## N and P-Channel Enhancement Mode Field Effect Transistor

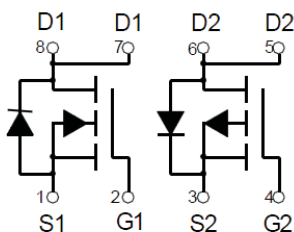
### Maximum ratings ( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	$V_{DS}$	60	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>(note1)</sup>	$I_D$	4.5	-3.5	A
Pulsed Drain Current	$I_{DM}$	18	-14	A
Continuous Source-Drain Diode Current	$I_S$	4.5	-3.5	A
Power Dissipation	$P_D$	2.0		W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	62.5		$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature	$T_J$	150		$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150		

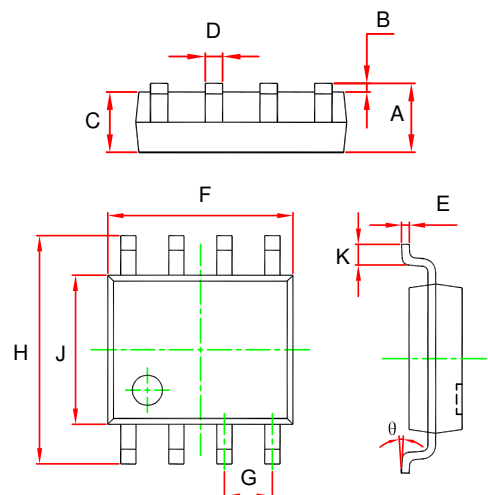
### Notes :

1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse Test : Pulse width=300 $\mu\text{s}$ , duty cycle $\leq 2\%$ .
3. Switching characteristics are independent of operating junction temperature.
4. Guaranteed by design, not subject to producing.

### Equivalent Circuit



## SOP-8



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.053	0.069	1.350	1.750	
B	0.004	0.010	0.100	0.250	
C	0.053	0.061	1.350	1.550	
D	0.013	0.020	0.330	0.510	
E	0.007	0.010	0.170	0.250	
F	0.189	0.197	4.800	5.000	
G	0.050 (BSC)		1.270 (BSC)		
H	0.228	0.244	5.800	6.200	
J	0.150	0.157	3.800	4.000	
K	0.016	0.050	0.400	1.270	
$\theta$	0 $^{\circ}$	8 $^{\circ}$	0 $^{\circ}$	8 $^{\circ}$	

## MOSFET ELECTRICAL CHARACTERISTICS

### N-ch MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0V$			1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 100$	nA
Gate threshold voltage (note 2)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	2.1	3	V
Drain-source on-resistance(note 2)	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 4.3A$		40	58	m $\Omega$
		$V_{GS} = 4.5V, I_D = 3.9A$		55	72	m $\Omega$
Forward tranconductance(note 2)	$g_{FS}$	$V_{DS} = 15V, I_D = 4.3A$		15		S
Diode forward voltage	$V_{SD}$	$I_S = 1.7A, V_{GS} = 0V$			1.2	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$		665		pF
Output Capacitance	$C_{oss}$			75		pF
Reverse Transfer Capacitance	$C_{rss}$			40		pF
Gate Resistance	$R_g$	$f = 1MHz$			3	$\Omega$
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	$t_{d(on)}$	$V_{GEN} = 4.5V, V_{DD} = 30V,$ $I_D = 3.4A, R_G = 1\Omega, R_L = 8.8\Omega$			25	ns
Turn-on rise time	$t_r$				100	ns
Turn-off delay time	$t_{d(off)}$				25	ns
Turn-off fall time	$t_f$				15	ns
Total Gate Charge	$Q_g$	$V_{DS} = 30V, I_D = 4.3A,$ $V_{GS} = 4.5V$			9	nC
Gate-Source Charge	$Q_{gs}$			2.3		nC
Gate-Drain Charge	$Q_{gd}$			2.6		nC

### P-ch MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^{\circ}\text{C}$ unless otherwise noted)

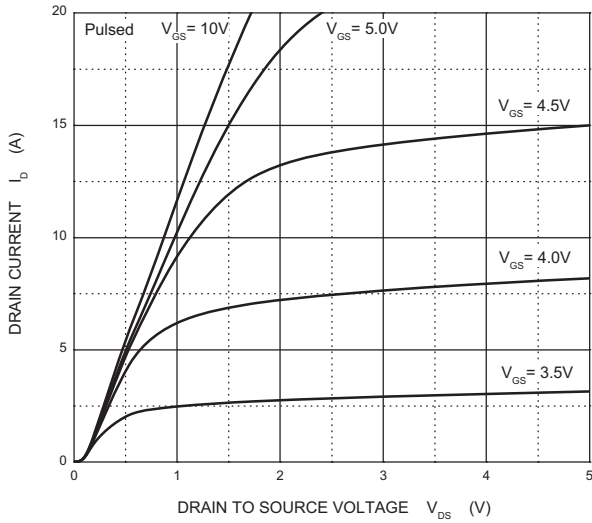
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-60			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -60V, V_{GS} = 0V$			-1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$			$\pm 100$	nA
Gate threshold voltage (note 2)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-2.8	-3	V
Drain-source on-resistance(note 2)	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -3.1A$		60	80	m $\Omega$
		$V_{GS} = -4.5V, I_D = -0.2A$		92	100	m $\Omega$
Forward tranconductance(note 2)	$g_{FS}$	$V_{DS} = -15V, I_D = -3.1A$		8.5		S
Diode forward voltage	$V_{SD}$	$I_S = -2A, V_{GS} = 0V$			-1.2	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$		650		pF
Output Capacitance	$C_{oss}$			95		pF
Reverse Transfer Capacitance	$C_{rss}$			60		pF
Gate Resistance	$R_g$	$f = 1MHz$			20	$\Omega$
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	$t_{d(on)}$	$V_{GEN} = -4.5V, V_{DD} = -30V,$ $I_D = -2.4A, R_G = 1\Omega,$ $R_L = 12.5\Omega$			45	ns
Turn-on rise time	$t_r$				105	ns
Turn-off delay time	$t_{d(off)}$				60	ns
Turn-off fall time	$t_f$				45	ns
Total Gate Charge	$Q_g$	$V_{DS} = -30V, I_D = -3.1A,$ $V_{GS} = -4.5V$			12	nC
Gate-Source Charge	$Q_{gs}$			2.2		nC
Gate-Drain Charge	$Q_{gd}$			3.7		nC



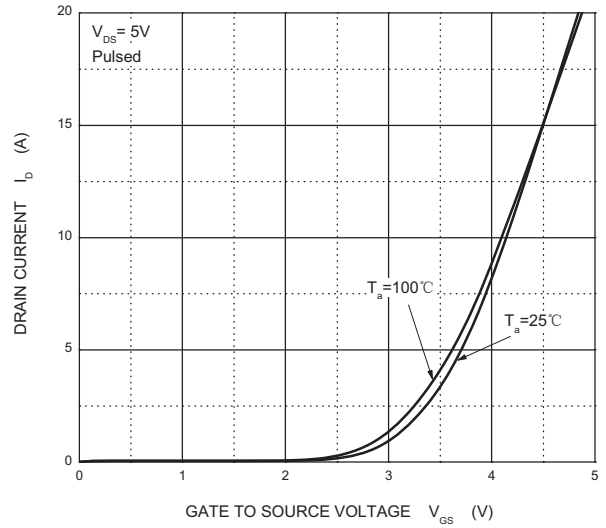
# Typical Characteristics

## N-Channel MOS

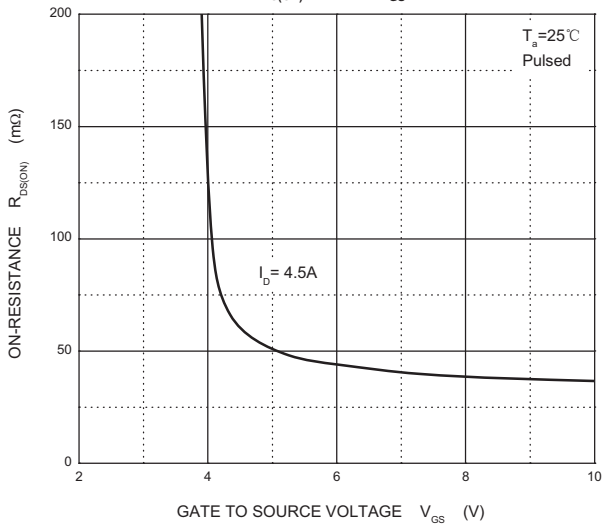
Output Characteristics



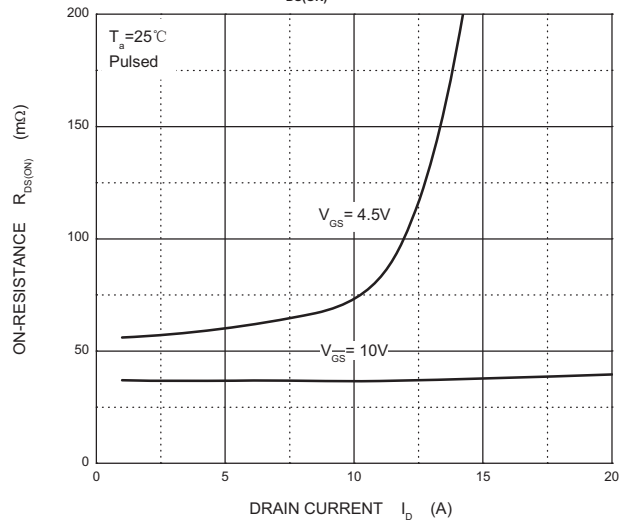
Transfer Characteristics



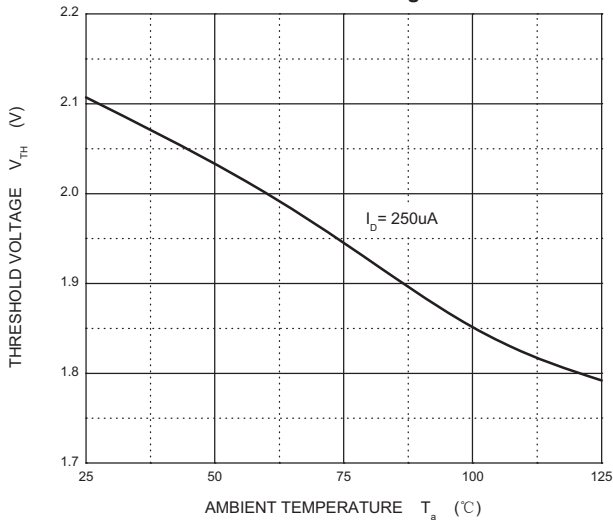
$R_{DS(ON)}$  —  $V_{GS}$



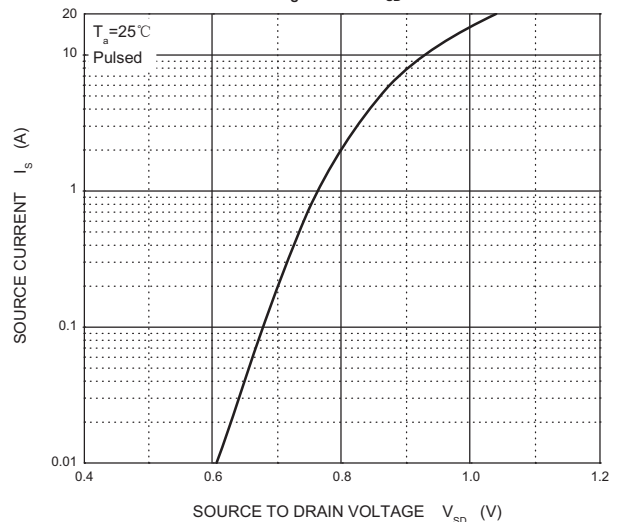
$R_{DS(ON)}$  —  $I_D$



Threshold Voltage



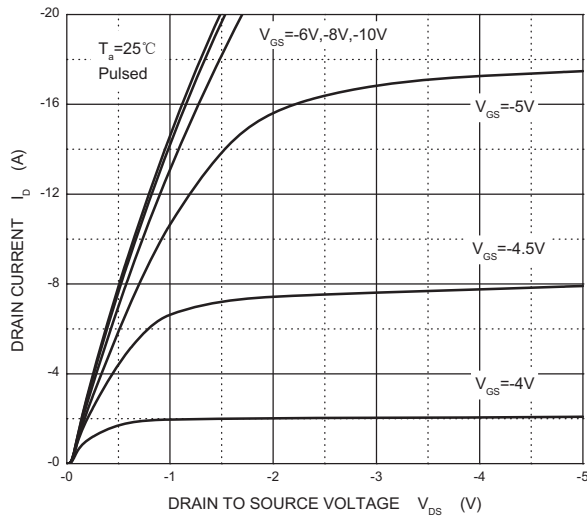
$I_S$  —  $V_{SD}$



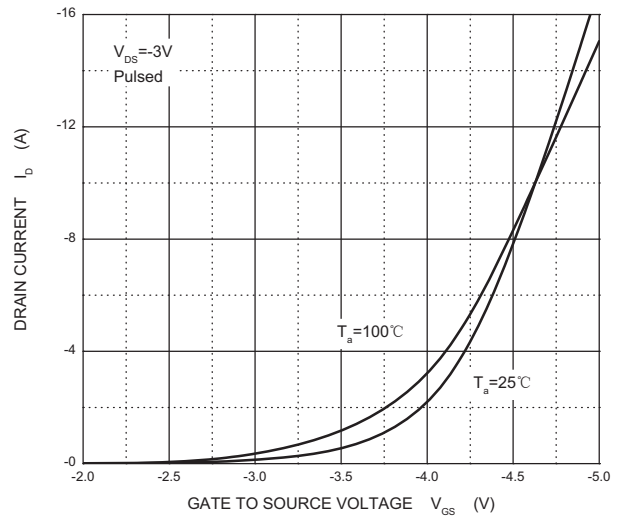
# Typical Characteristics

## P-Channel MOS

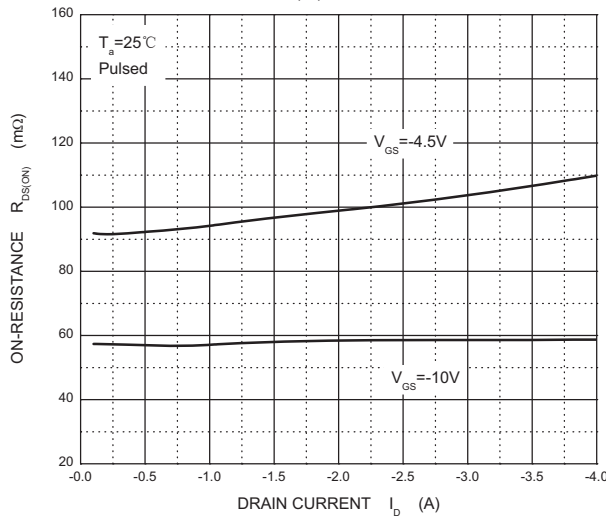
Output Characteristics



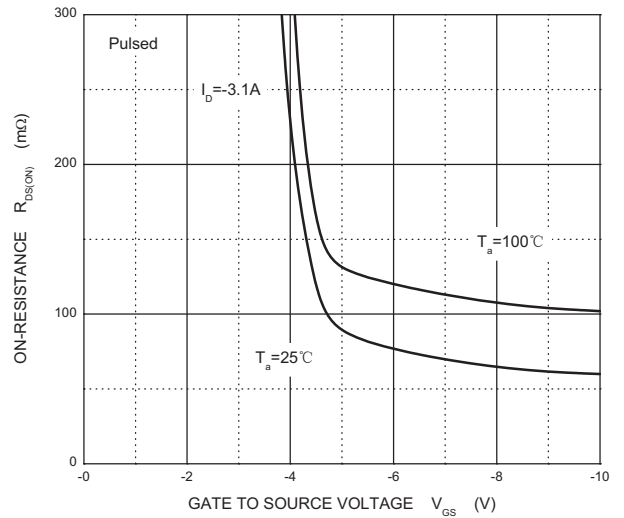
Transfer Characteristics



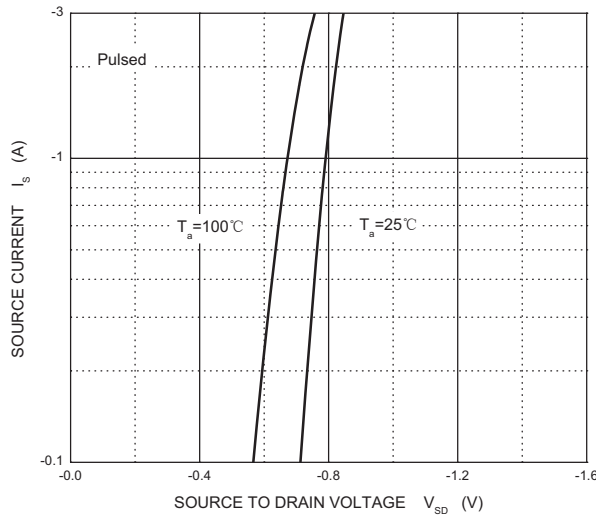
$R_{DS(ON)}$  —  $I_D$



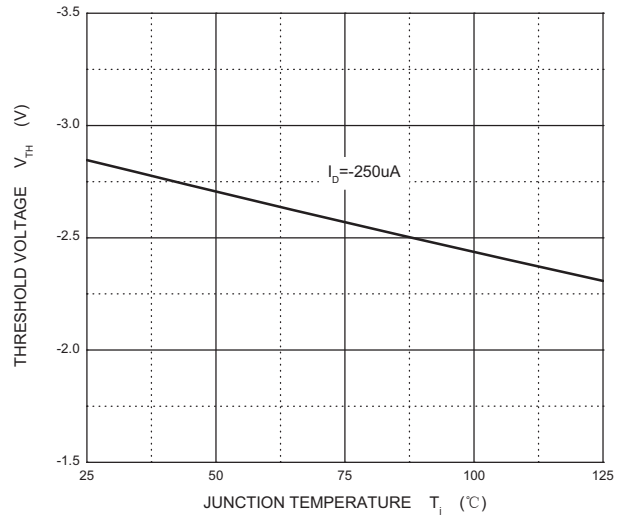
$R_{DS(ON)}$  —  $V_{GS}$



$I_S$  —  $V_{SD}$



Threshold Voltage





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Ordering Information :

Device	Packing
Part Number-TP	Tape&Reel:4Kpcs/Reel

Note : Adding "-HF" suffix for halogen free, eg. Part Number-TP-HF

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