P-Channel Enhancement MOSFET

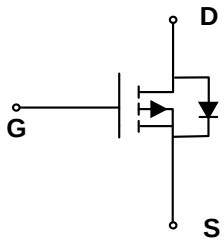
Features

- Small Signal MOSFETs
- V_{DS}= -40V, I_D = -5A
  $R_{DS(on)}$ < 85mΩ @ V_{GS} = -10V
  $R_{DS(on)}$ < 125mΩ @ V_{GS} = -4.5V
- Trench LV MOSFET Technology

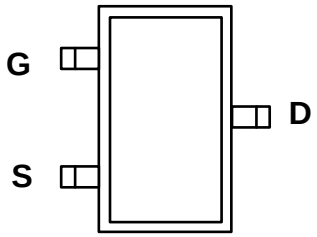
Mechanical Characteristics

- Marking : Making Code
- RoHS Compliant & Halogen-Free
- SOT-23 Package

Schematic & PIN Configuration



Device Symbol



SOT-23(Top View)

Absolute Maximum Ratings (T_A = 25°C, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25°C	I_D	-5	A
Pulsed Drain Current [1]		I_{DM}	-20	A
Total Power Dissipation	T_A=25°C	P_D	1.2	W
Operating Junction and Storage Temperature Range		T_J ,T_{STG}	-55 to +150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction to Ambient [2]	$R_{\theta JA}$	104	°C/W

Electrical Characteristics (T_J = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = -250μA	-40	-	-	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -40V, V_{GS} = 0V	-	-	-1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D = -250μA	-1.2	-1.5	-2.5	V
Drain-Source on-state Resistance (3)	$R_{DS(on)}$	V_{GS} = -10V, I_D = -5A	-	68	85	mΩ
		V_{GS} = -4.5V, I_D = -4A	-	84	125	
Dynamic Characteristics (4)						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = -20V, f = 1MHz	-	553	-	pF
Output Capacitance	C_{oss}		-	50	-	
Reverse Transfer Capacitance	C_{rss}		-	42	-	
Switching Characteristics (4)						
Total Gate Charge	Q_g	V_{GS}= -10V ,V_{DS}= -20V, I_D = -5A	-	11.8	-	nC
Gate-Source Charge	Q_{gs}		-	2.2	-	
Gate-Drain Charge	Q_{gd}		-	3	-	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = -20V, V_{GS} = -10V, R_G = 3Ω, I_D = -5A	-	7	-	ns
Rise Time	t_r			6.5		
Turn-off Delay Time	$t_{d(off)}$		-	24	-	
Fall Time	t_f		-	7.8	-	
Source-Drain Body Diode Characteristics						
Diode Forward Voltage (3)	V_{SD}	I_S = -5A, V_{GS} = 0V	-	-	-1.2	V
Continuous Source Current	I_S		-	-	-5	A

Note1：Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C

Note2：The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.

Note3：Pulse Test: Pulse width≤300μs, duty cycle≤2%

Note4：This value is guaranteed by design hence it is not included in the production test

Typical Characteristics

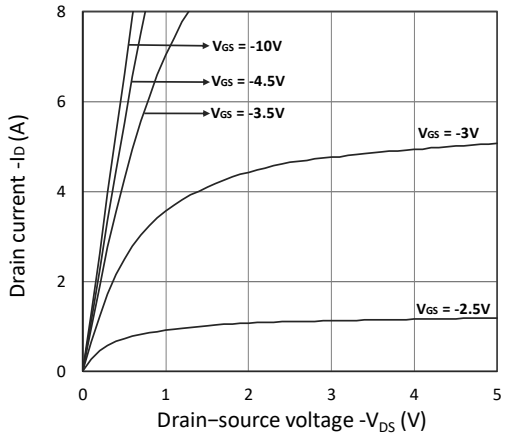


Figure 1. Output Characteristics

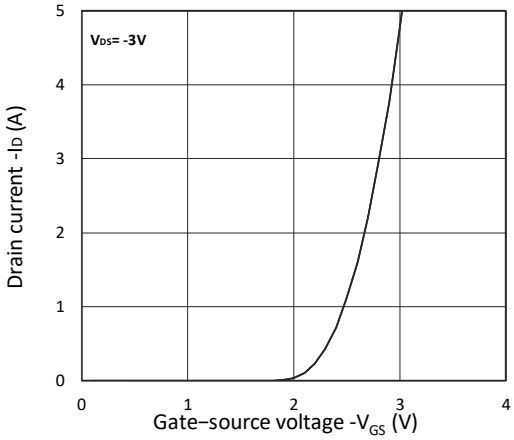


Figure 2. Transfer Characteristics

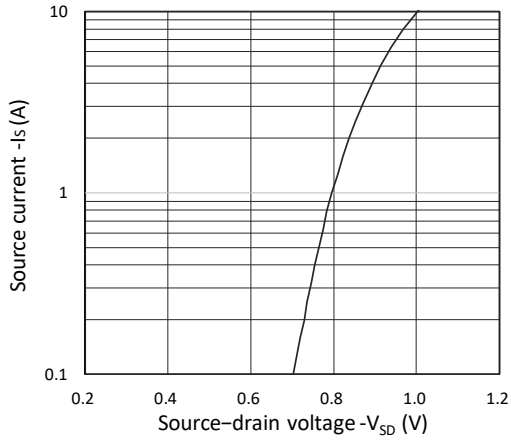


Figure 3. Forward Characteristics of Reverse

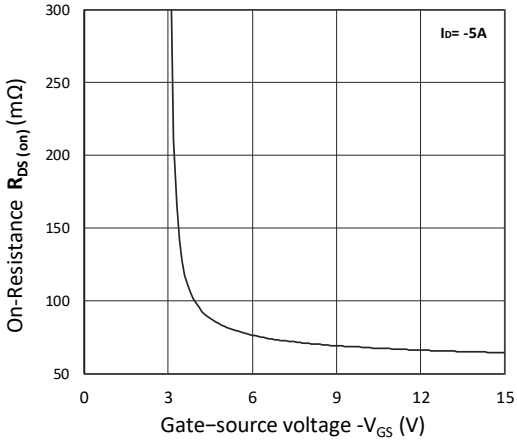


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

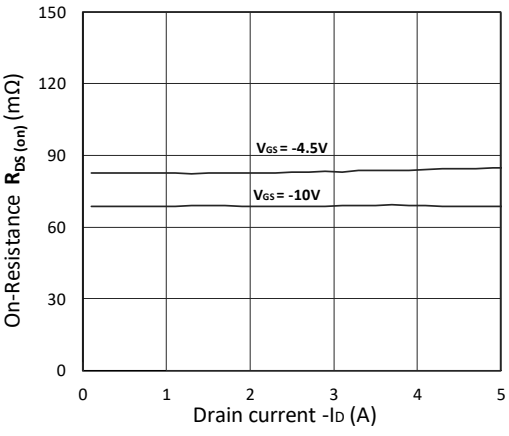


Figure 5. $R_{DS(ON)}$ vs. I_D

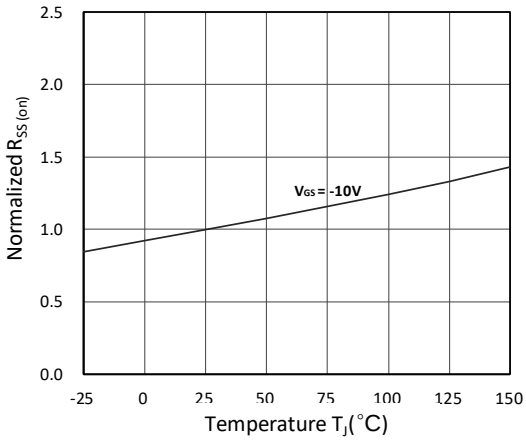


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

Typical Characteristics(Continued)

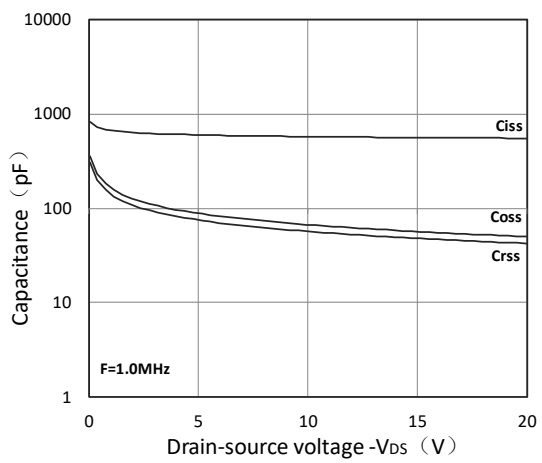


Figure 7. Capacitance Characteristics

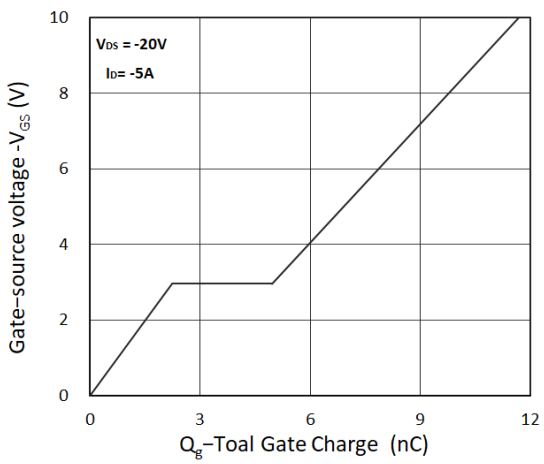
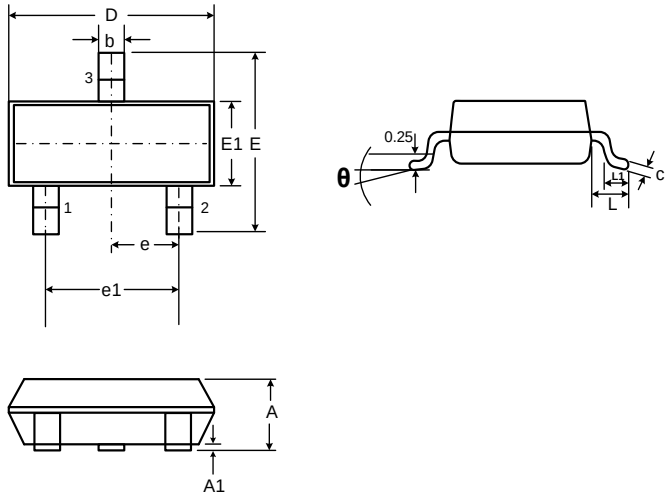


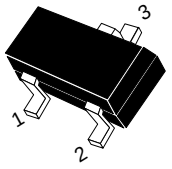
Figure 8. Gate Charge Characteristics

Package Dimension

SOT-23

PACKAGE OUTLINE





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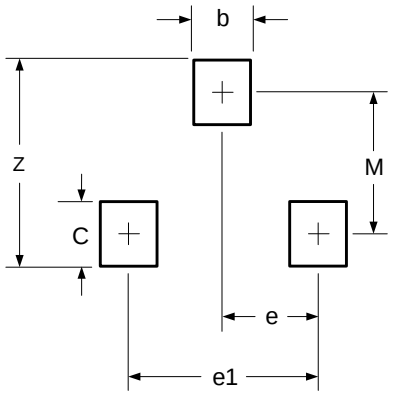
SYMBOL	MILLIMETER	
	MIN	MAX
A	0.90	1.15
A1	0.00	0.10
b	0.30	0.50
c	0.08	0.15
D	2.80	3.00
E	2.25	2.55
E1	1.20	1.40
e	0.95 BSC	
e1	1.80	2.00
L	0.55REF	
L1	0.30	0.50
θ	0°	8°



DIMENSIONS	
DIM	MILLIMETERS
M	2.02
C	0.80
Z	2.82
e	0.95 BSC
e1	1.90 BSC
b	0.80

Ordering Information

Part	Package	Marking	Packing Information
EM04P50M	SOT-23	0450	3k/Reel

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2023-12-13	Released Version	Qin Pei Long	Qi Shu Kun	Liu Jia Ying