Etek Microelectronics

EM02N31M

N-Channel MOSFET

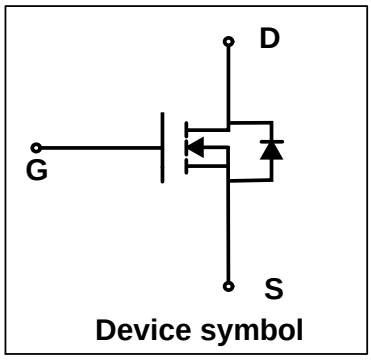
Features

- V_{DS}= 20 V, I_D = 3.1A
  $R_{DS(on)}$ < 45mΩ @ V_{GS} = 4.5V
  $R_{DS(on)}$ < 60mΩ @ V_{GS} = 2.5V
- Trench LV MOSFET Technology

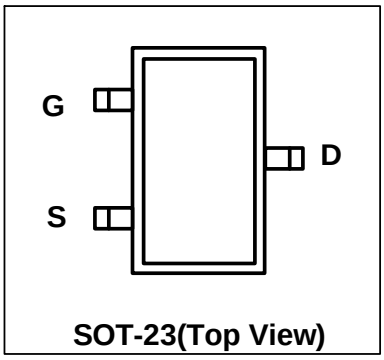
Mechanical Characteristics

- SOT-23 Package
- Marking : Making Code
- RoHS Compliant
- MSL3

Schematic & PIN Configuration



Device symbol



SOT-23(Top View)

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

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current	T_A = 25°C	I_D	3.1	A
Pulsed Drain Current[1]		I_{DM}	12.4	A
Power Dissipation	T_A = 25°C	P_D	700	mW
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Electrical Characteristics (T_{amb}=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250μA	20	-	-	V
Drain Cut-off Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0 V	-	-	1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±8V, V_{DS} = 0 V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS}, I_D = 250μA	0.4	0.75	1.2	V
Drain-Source on-State Resistance[3]	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 3.1A	-	33	45	mΩ
		V_{GS} = 2.5V, I_D = 2.5A	-	43	60	
Dynamic Characteristics[4]						
Input Capacitance	C_{iss}	V_{GS} =0V, V_{DS} = 10V, f = 1 MHz	-	300	-	pF
Output Capacitance	C_{oss}		-	54	-	
Reverse Transfer Capacitance	C_{rss}		-	43	-	
Switching Characteristics[4]						
Total Gate Charge	Q_g	V_{DS} = 10V, V_{GS} = 4.5V, I_D = 3A	-	2.9	-	nC
Gate-Source charge	Q_{gs}		-	0.4	-	
Gate-Drain Charge	Q_{gd}		-	0.6	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS} = 4.5V,V_{DS} = 10V, R_L = 3.3Ω, R_G = 6Ω	-	2.5	-	ns
Turn-on Rise Time	t_f		-	3.2	-	
Turn-off Delay Time	$t_{d(off)}$		-	21	-	
Turn- off Fall Time	t_f		-	3	-	
Source-Drain Diode characteristics						
Body Diode Voltage	V_{SD}	I_S= 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current	I_S		-	-	3.1	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C
2. 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.
3. Pulse Test: Pulse width≤300μs, duty cycle≤2%.
4. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

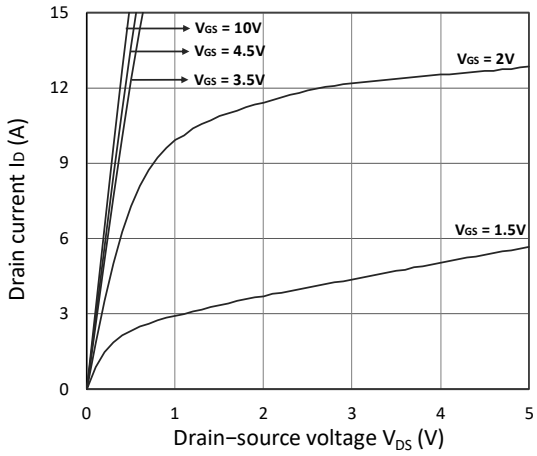


Figure 1. Output Characteristics

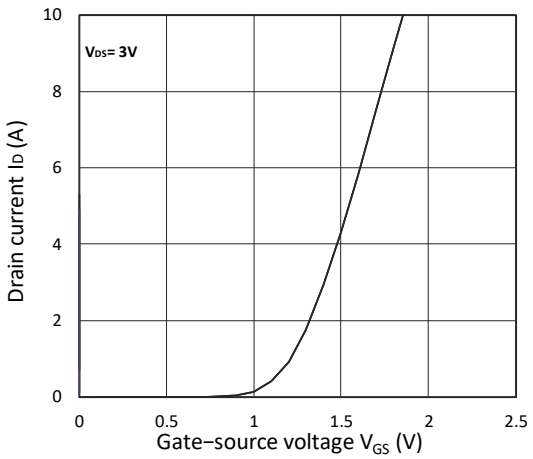


Figure 2. Transfer Characteristics

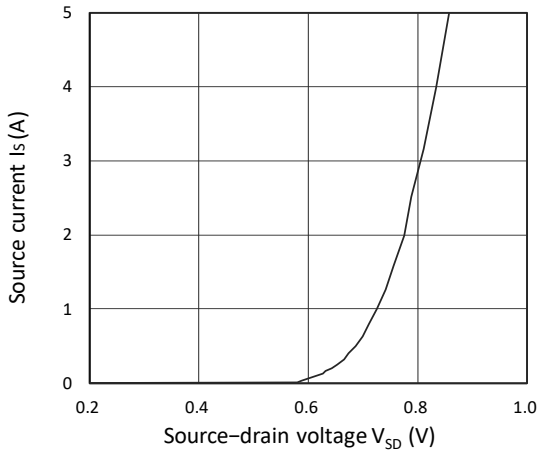


Figure 3. Forward Characteristics of Reverse

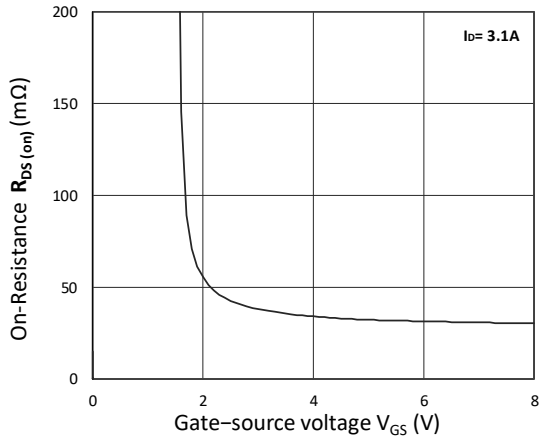


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

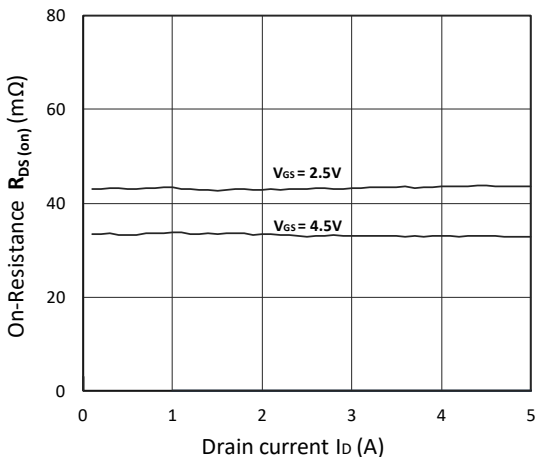


Figure 5. $R_{DS(ON)}$ vs. I_D

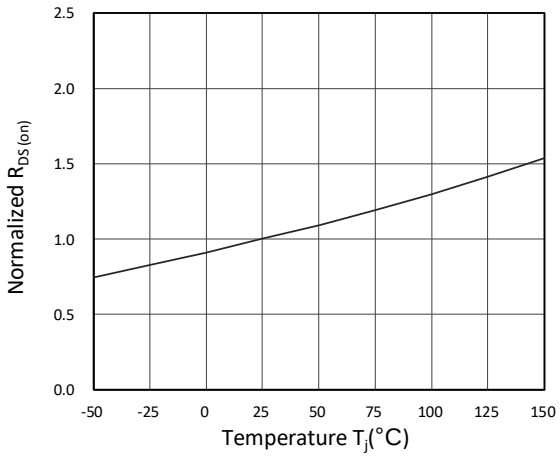


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

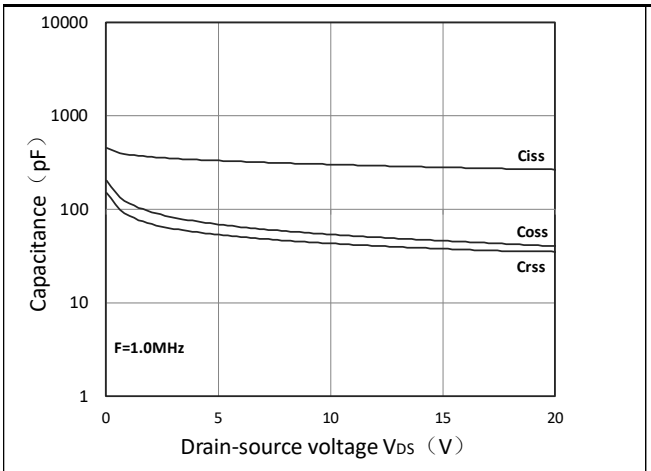


Figure 7. Capacitance Characteristics

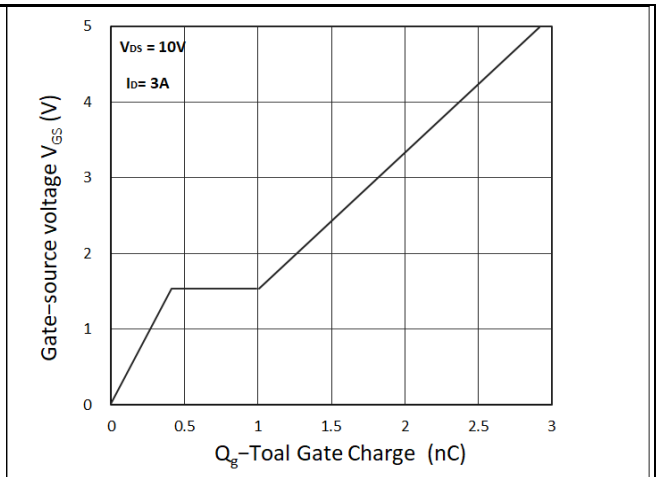
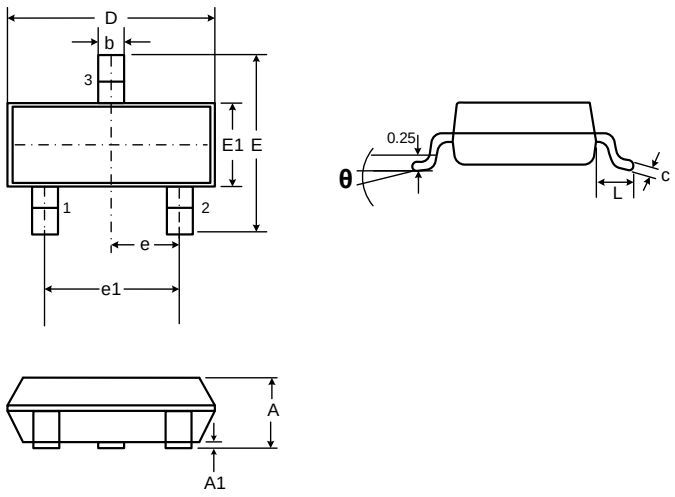
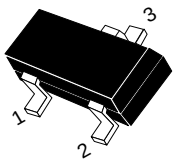


Figure 8. Gate Charge Characteristics

Outline Drawing – SOT-23

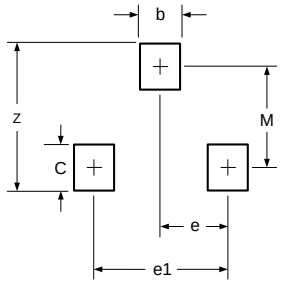
PACKAGE OUTLINE





SOT-23

DIMENSIONS				
SYMBOL	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.15	0.035	0.045
A1	0.00	0.10	0.000	0.004
b	0.30	0.50	0.012	0.020
c	0.08	0.15	0.003	0.006
D	2.80	3.00	0.110	0.118
E	2.25	2.55	0.089	0.100
E1	1.20	1.40	0.047	0.055
e	0.95 BSC		0.0374 BSC	
e1	1.80	2.00	0.071	0.079
L	0.45	0.65	0.018	0.026
θ	0°	8°	0°	8°

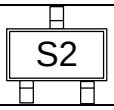


DIMENSIONS		
DIM	INCHES	MILLIMETERS
M	0.080	2.02
C	0.032	0.80
Z	0.111	2.82
e	0.037 BSC	0.95 BSC
e1	0.075 BSC	1.9 BSC
b	0.032	0.80

Notes

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.

Marking Codes

Part Number	EM02N31M
Marking Code	

Package Information

Qty：3k/Reel

Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2013-01-22	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying