FMOS2310-Q1

List

FMOS2310-Q1

3A 60V N-Channel Enhancement Mode MOSFET

Features

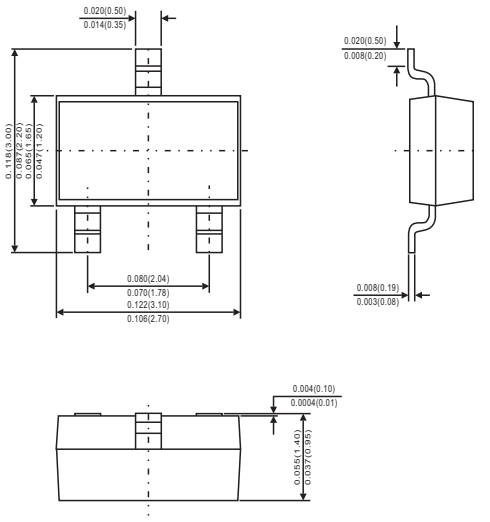
- High power and current handing capability
- Lead free product is acquired
- Surface mount package
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free part, ex.FMOS2310-Q1-H

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-23
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any
- Weight : Approximated 0.008 gram

Package outline

SOT-23



Dimensions in inches and (millimeters)

Maximum ratings (T_A=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current	I_D	3	A
Pulsed drain current (Note 1)	I_{DM}	10	A
Power dissipation	P_D	350	mW
Thermal resistance form junction to ambient (Note 2)	$R_{\theta JA}$	357	℃/W
Operating Junction temperature range	T_j	-55 to +150	℃
Storage temperature range	T_{STG}	-55 to +150	℃

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Electrical characteristics (At T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
On characteristics						
Gate threshold voltage (Note 3)	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.5		2.0	V
Forward tranconductance (Note 3)	g_{FS}	V_{DS}=15V, I_D=2A	1.4			S
Drain-source on-resistance (Note 3)	$R_{DS(ON)}$	V_{GS}=10V, I_D=3A			105	mΩ
		V_{GS}=4.5V, I_D=3A			125	
Dynamic Parameters (Note 4)						
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=30V, f=1.0MHz		247		pF
Output capacitance	C_{oss}			34		
Reverse transfer capacitance	C_{rss}			19.5		
Switching parameters (Note 4)						
Total gate charge	Q_g	V_{GS}=4.5V, V_{DS}=30V, I_D=3A		6		nC
Gate to source charge	Q_{gs}			1		
Gate to Drain charge	Q_{gd}			1.3		
Turn-on delay time	$t_{d(on)}$	V_{DS}=30V, V_{GS}=10V, I_D=1.5A, R_G=1Ω		6		ns
Rise time	t_r			15		
Turn-off delay time	$t_{d(off)}$			15		
Fall time	t_f			10		
Source-drain diode ratings and characteristics						
Drain - source diode forward voltage	V_{SD}	V_{GS}=0V, I_{SD}=3A			1.2	V

Notes : 1. Reptile ratings : Pulse width limited by junction temperature.

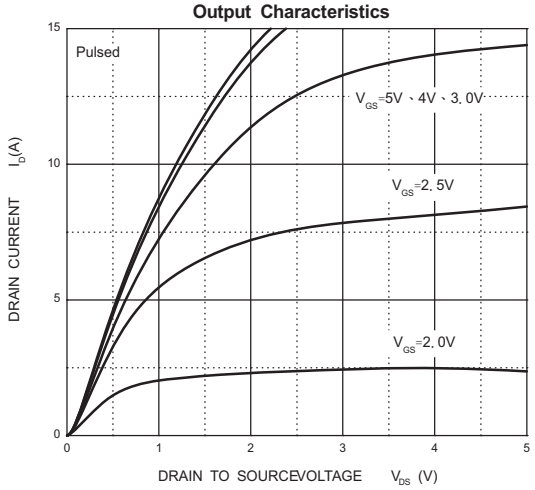
2. Surface mounted on Fr4 Board, t ≤ 10s.

3. Pulse test : Pulse width ≤ 300μs, Duty cycle ≤ 0.5%.

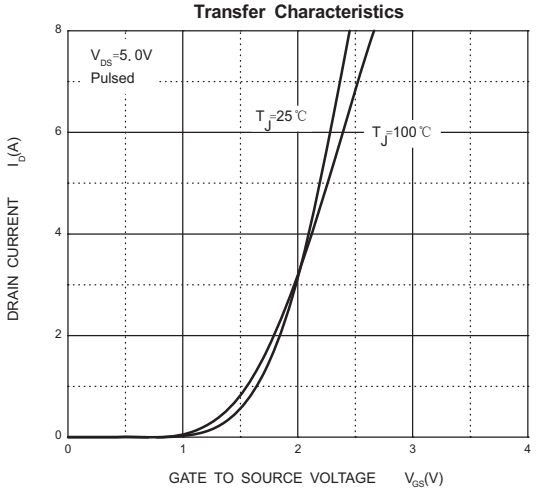
4. Guaranteed by design, not subject to production.

Rating and characteristic curves (FMOS2310-Q1)

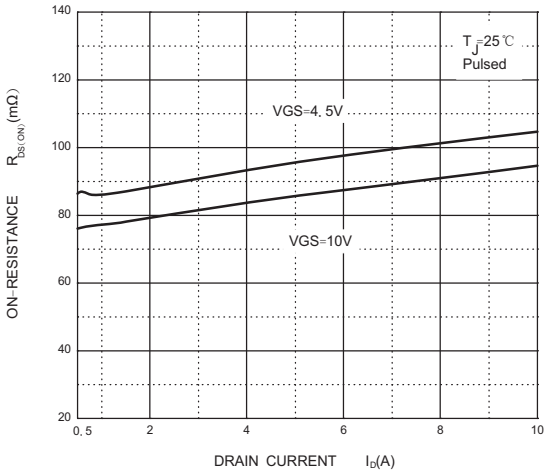
Output Characteristics



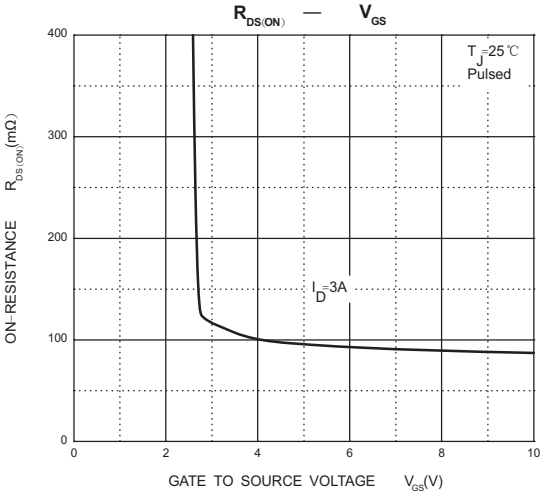
Transfer Characteristics



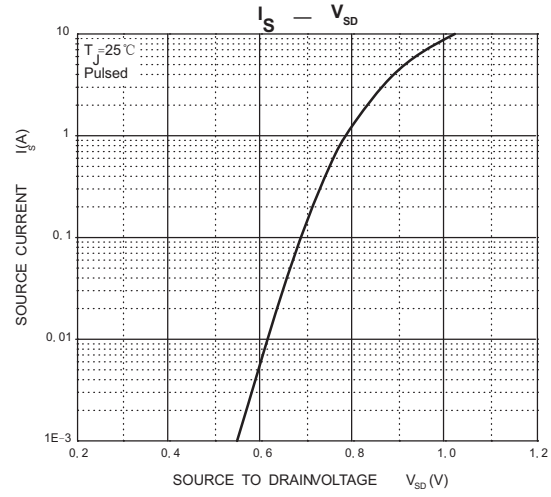
$R_{DS(ON)}$ — I_D



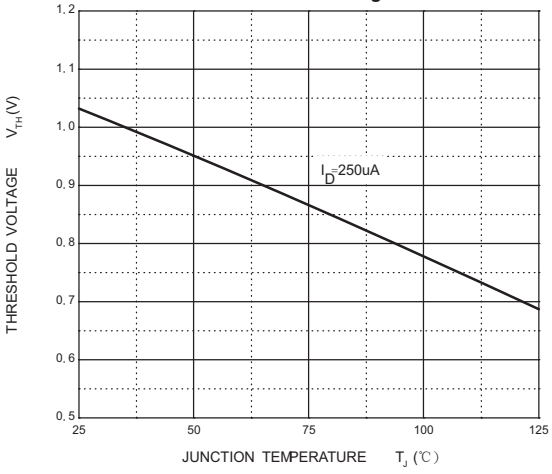
$R_{DS(ON)}$ — V_{GS}



I_S — V_{SD}



Threshold Voltage



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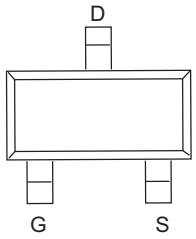
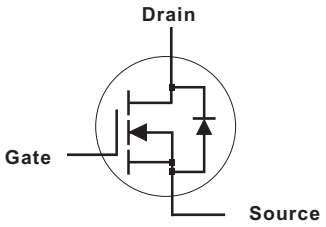
Pinning information

Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMOS2310-Q1	2310

Suggested solder pad layout

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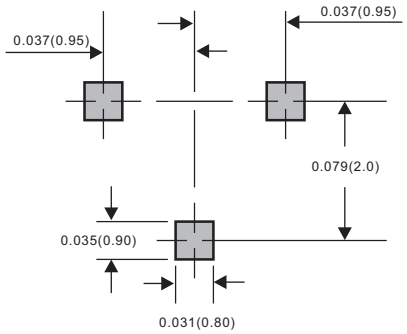

Dimensions in inches and (millimeters)

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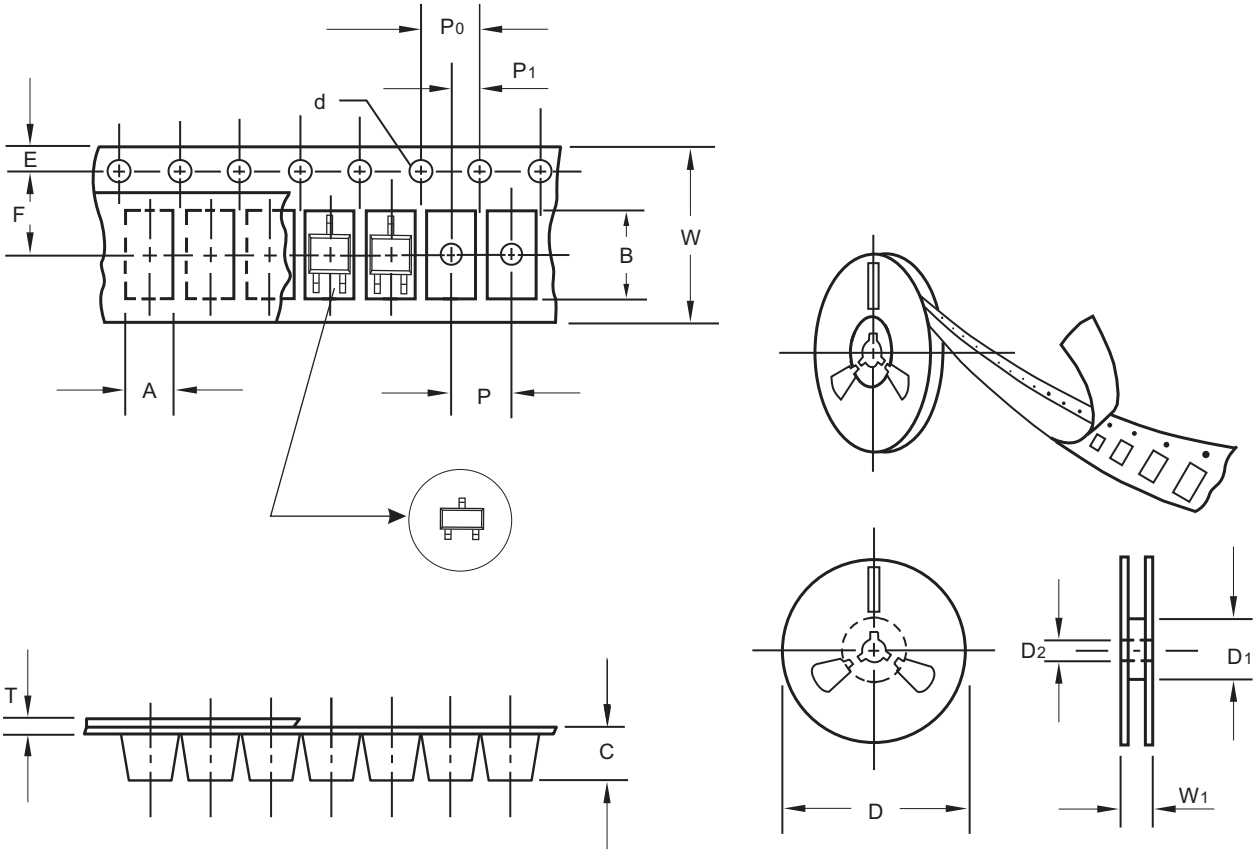
Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	55.00
Feed hole diameter	D_2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	4.00
Sprocket hole pitch	P_0	0.1	4.00
Embossment center	P_1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W_1	1.0	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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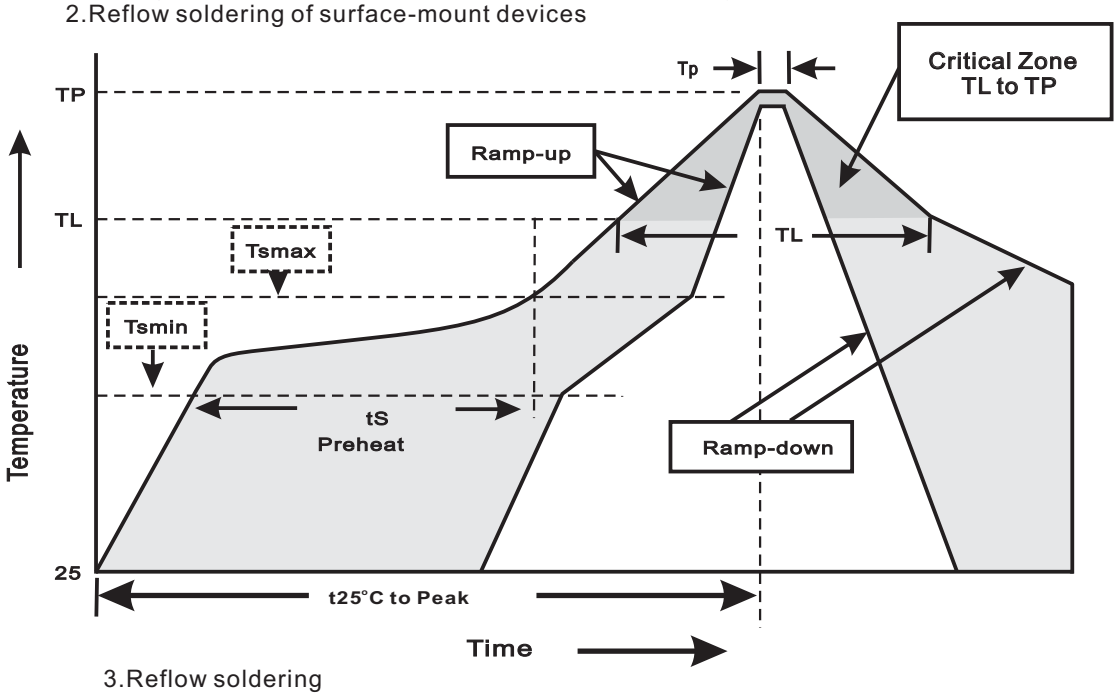
Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
2.Reflow soldering of surface-mount devices



3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T_L to T_P)	<3°C/sec
Preheat -Temperature Min(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax to T_L -Ramp-upRate	 <3°C/sec
Time maintained above: -Temperature(T_L) -Time(t_L)	 217°C 60~260sec
Peak Temperature(T_P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t_P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125℃+168hrs@85℃ /85%RH+3xIR@260℃+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	V_{DS}=V_{DS}*80% (Tj max=150°C)Test Duration:1000hrs	JESD22-A108
3. High Temperature Storage Life	Ta=125℃ Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55℃(15min) to 150℃(15min)Test Cycles:1000cycles	JESD22 A-104
5. Autoclave	P=2atm Ta=121℃ RH=100% Test Duration:96hrs	JESD22 A-102
6. Solderability	245±5℃ for 5sec	J-STD-002
7. Moisture Resistance	Ta=85℃/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	260±5℃ for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	Ta=85℃, 85%RH,V_{DS}=80% ratedV_{DS} Test Duration:1000hrs	JESD22-A101