

FMOS2302W-Q1-H

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FMOS2302W-Q1-H

2.1A 20V N-Channel Enhancement Mode MOSFET

Features

- $R_{DS(ON)} \leq 80m\Omega$ @ $V_{GS}=4.5V$, $I_D=2.1A$.
- $R_{DS(ON)} \leq 125m\Omega$ @ $V_{GS}=2.5V$, $I_D=2.1A$.
- TrenchFET power MOSFET.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

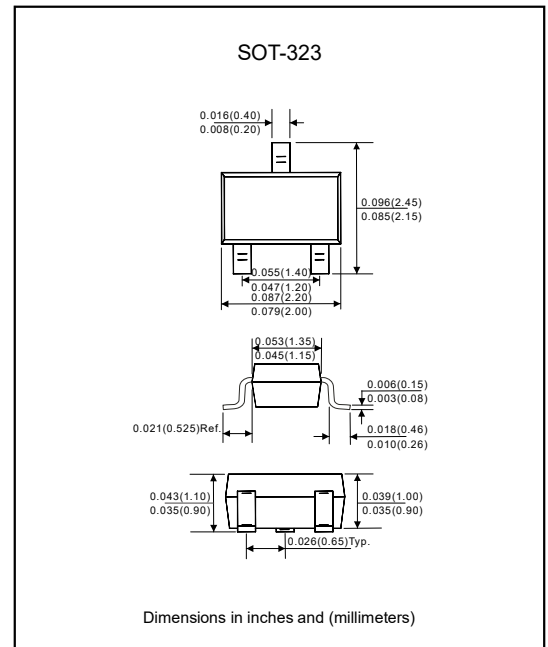
Applications

- Load switch for portable devices
- DC/DC Converter

Mechanical data

- Epoxy: UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-323.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package outline



Maximum ratings (At $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Ratings	Units
Drain-source voltage	V_{DS}	20	V
Gate-source voltage	V_{GS}	± 8	V
Continuous drain current	I_D	2.1	A
Continuous source-drain diode current (diode conduction)	I_S	0.6	A
Power dissipation	P_D	0.35	W
Typical thermal resistance, junction to ambient ($t \leq 5s$)	$R_{\theta JA}$	357	$^\circ C/W$
Junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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Electrical characteristics (At $T_A=25^{\circ}\text{C}$ unless otherwise specified)

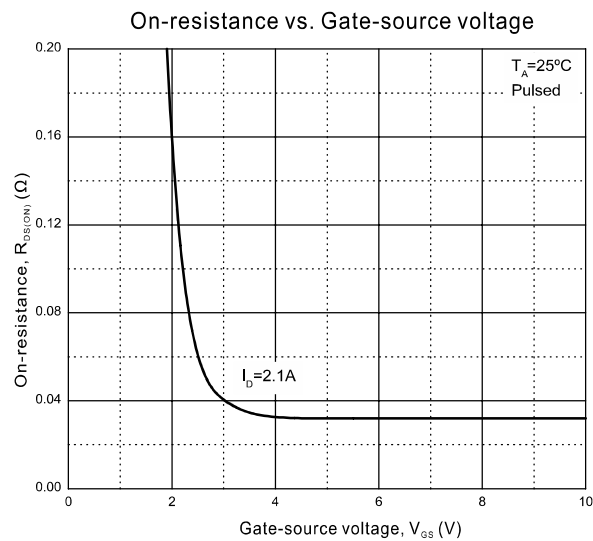
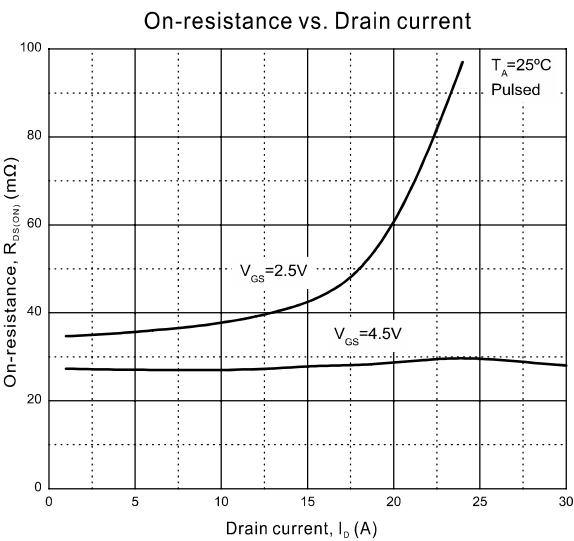
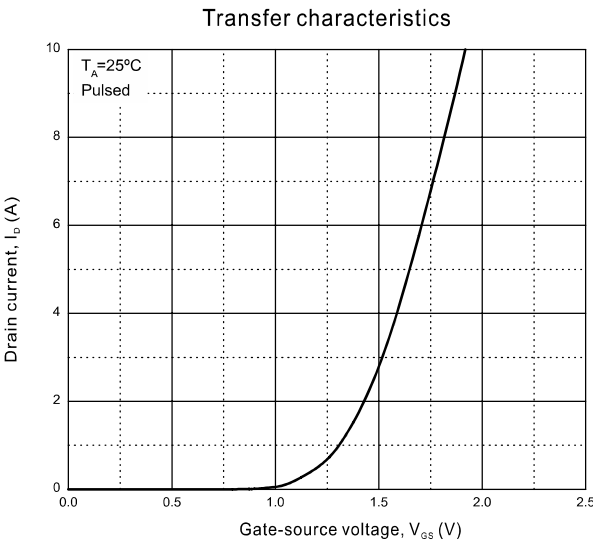
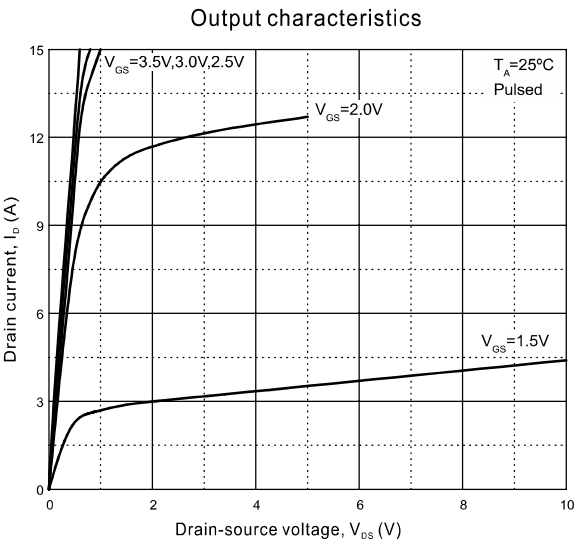
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =10μA, V _{GS} =0V	20			V
Drain-source leakage current	I _{DSS}	V _{DS} =20V, V _{GS} =0V			1	μA
Gate-source leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±8V			±100	nA
On characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =50μA	0.65	0.95	1.20	V
Static drain-source on-resistance (Note 1)	R _{DS(on)}	V _{GS} =4.5V, I _D =2.1A		55	80	mΩ
		V _{GS} =2.5V, I _D =2.1A		78	125	
Forward transconductance (Note 1)	g _{FS}	V _{DS} =5V, I _D =2.1A		8		S
Dynamic parameters						
Input capacitance (Note 2)	C _{iss}	V _{GS} =0V, V _{DS} =10V, f=1.0MHz		300		pF
Out capacitance (Note 2)	C _{oss}			120		
Reverse transfer capacitance (Note 2)	C _{rss}			80		
Switching parameters (Note2)						
Threshold gate charge	Q _g	V _{GS} =4.5V, V _{DS} =10V, I _D =2.1A		4	10	nC
Gate-source charge	Q _{gs}			0.65		
Gate-drain charge	Q _{gd}			1.5		
Turn-on delay time	t _{d(on)}	V _{DD} =10V, V _{GEN} =4.5V, R _L =5.5Ω, R _G =6Ω, I _D ≈2.1A		7	15	ns
Rise time	t _r			55	80	
Turn-off delay time	t _{d(off)}			16	60	
Fall time	t _f			10	25	
Source-drain diode ratings and characteristics						
Drain-source diode forward voltage	V _{SD}	I _S =0.94A , V _{GS} =0V		0.76	1.2	V

Note: 1. Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

2. These parameters have no way to verify.

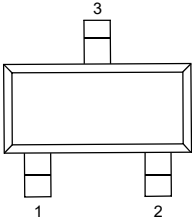
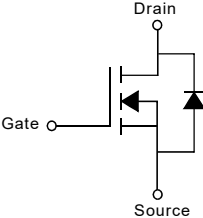
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Rating and characteristic curves



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Pinning information

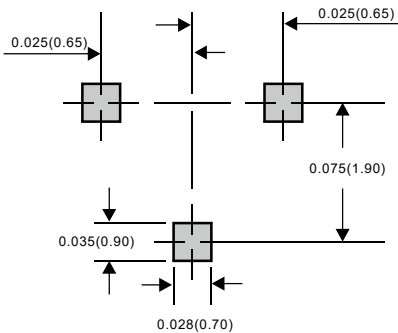
Pin	Simplified outline	Symbol
Pin 1 Gate Pin 2 Source Pin 3 Drain		

Marking

Type number	Marking code
FMOS2302W-Q1-H	2302

Suggested solder pad layout

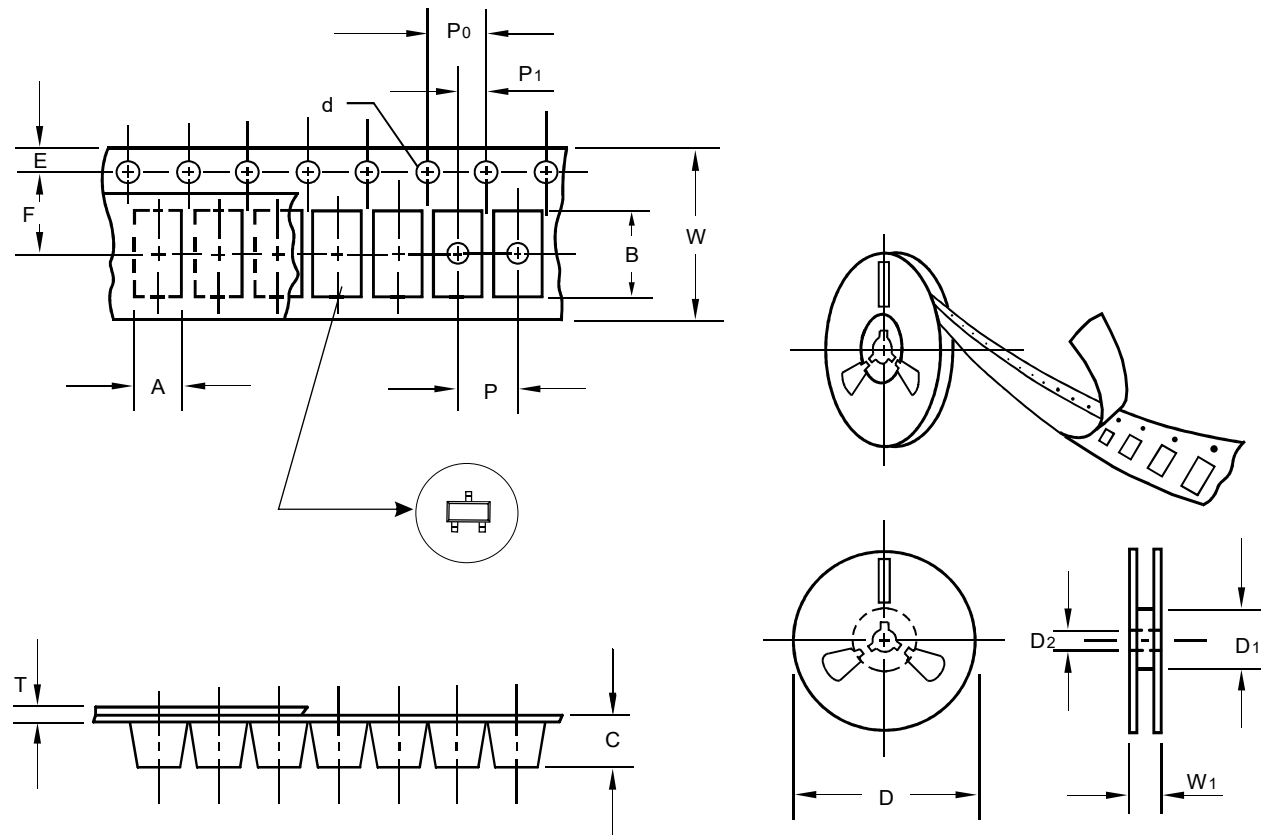
SOT-323



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-323
Carrier width	A	0.1	2.36
Carrier length	B	0.1	2.40
Carrier depth	C	0.1	1.20
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	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	P0	0.1	4.00
Embossment center	P1	0.1	2.00
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

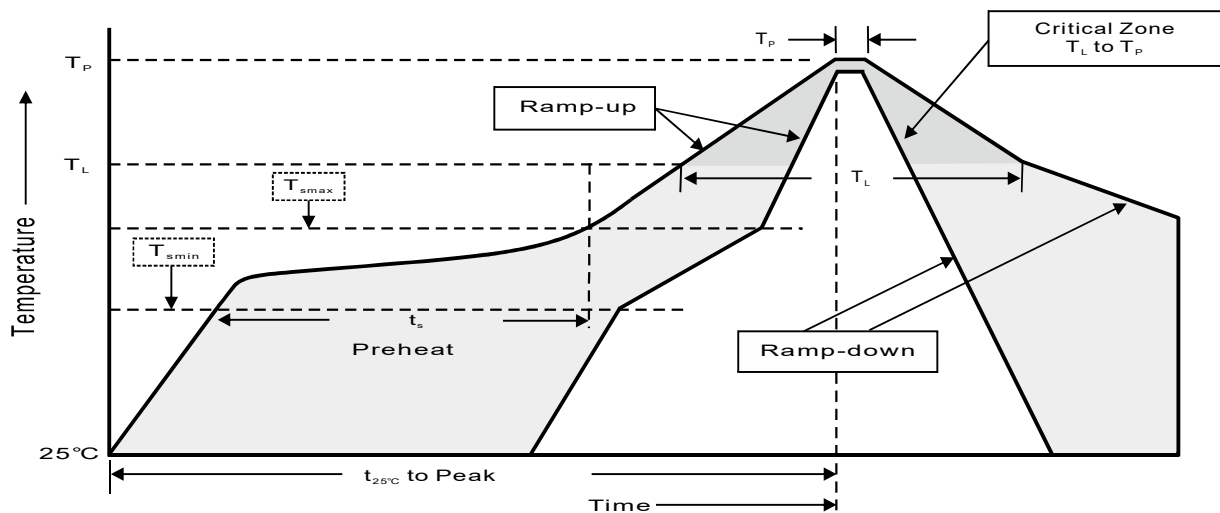
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Reel packing

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)
SOT-323	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000

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 (T_{min}) - Temperature Max (T_{max}) - Time (Min to Max) (t_s)	150°C 200°C 60 ~ 120 sec
T_{smax} to T_L - Ramp-up rate	< 3 °C/sec
Time maintained above : - Temperature (T_L) - Time (T_L)	217°C 60 ~ 260 sec
Peak temperature (T_p)	255 °C -0/+5°C
Time with 5°C of actual peak temperature (T_p)	10 ~30 sec
Ramp-down rate	< 6 °C/sec
Time 25°C to peak temperature	< 6 minutes

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High reliability test capabilities

Item	Conditions	Reference
1. MSL Preconditioning	24hr bake @125°C+168hrs @85°C / 85%RH + 3 x I _{DSS} @260°C + 1flux Immersion + Alcohol + DI H2O rinse	JESD22-A113
2. High Temperature Reverse Bias	V _{DS} = V _{DS} x 80% (T _J = T _J max.) Test Duration : 1000hrs	JESD22-A108
3. High Temperature Storage Life	T _A = 150°C Test Duration:1000hrs	JESD22 A-103
4. Temperature Cycle	-55°C (15min) to 150°C (15min) Test Cycles : 1000cycles	JESD22 A-104
5. Autoclave	P = 2Atm T _A = 121°C RH = 100% Test Duration : 96hrs	JESD22 A-102
6. Solder ability	245 ± 5°C for 5sec	J-STD-002
7. Moisture Resistance	T _A = 85°C / 85% Relative Humidity Test Duration : 1000hrs	MIL-STD-750E METHOD 1021.2
8. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
9. High Temperature High Humidity Reverse Bias	T _A = 85°C, 85% RH, V _{DS} = 80% rated V _{DS} Test Duration : 1000hrs	JESD22-A101