

FMOS05N04-Q1-H

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FMOS05N04-Q1-H

5.0A 40V N-Channel Enhancement Mode Power MOSFET

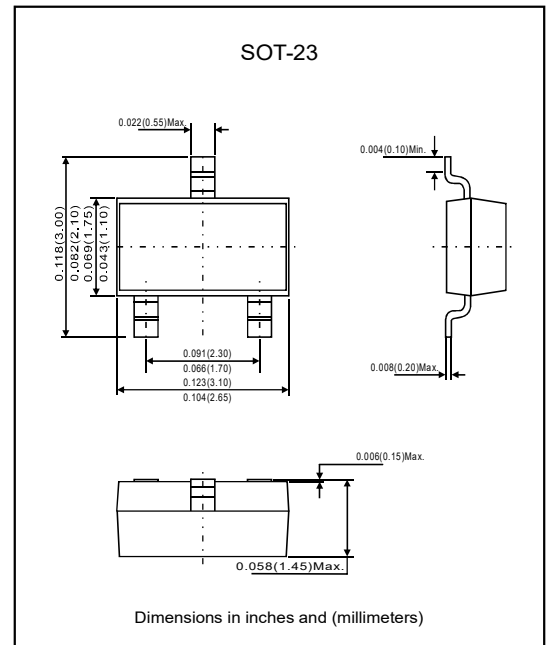
Features

- $V_{DS} = 40V$, $I_D = 5A$.
- $R_{DS(ON)} \leq 45m\Omega$, @ $V_{GS} = 10V$, $I_D = 5$.
- $R_{DS(ON)} \leq 60m\Omega$, @ $V_{GS} = 4.5V$, $I_D = 3$.
- Improved dv/dt capability.
- Fast switching.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free partss meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

Mechanical data

- Epoxy : UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Weight : Approximated 11mg.

Package outline



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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	I_D	5	A
Pulse drain current tested (note 1)	I_{DM}	19	A
Power dissipation (note 1)	P_D	1.2	W
Thermal resistance junction to ambient	$R_{\theta JA}$	104	$^\circ C/W$
Maximum junction temperature	T_J	+150	$^\circ C$
Storage temperature range	T_{STG}	-55 to +150	$^\circ C$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	40			V
Drain-source leakage current	I_{DSS}	$V_{DS}=40\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 100	nA

On characteristics

Gate threshold voltage (Note 3)	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.0		2.5	V
Static drain-source on-resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=5\text{A}$			45	m Ω
		$V_{GS}=4.5\text{V}$, $I_D=3\text{A}$			60	

Dynamic Parameters (Note3)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, $f=1.0\text{MHz}$		495		pF
Output capacitance	C_{oss}			42		
Reverse transfer capacitance	C_{rss}			33		

Switching parameters (Note3)

Total gate charge	Q_g	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=3.5\text{A}$		10		nC
Gate to source charge	Q_{gs}			1.4		
Gate to Drain charge	Q_{gd}			1.9		
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=20\text{V}$, $V_{GS}=10\text{V}$, $R_G=3\Omega$, $I_D=3.5\text{A}$		15		ns
Rise time	t_r			49.5		
Turn-off delay time	$t_{D(OFF)}$			19.2		
Fall time	t_f			11		

Source-drain diode ratings and characteristics

Drain - source diode forward voltage (Note 2)	V_{SD}	$I_S=1\text{A}$, $V_{GS}=0\text{V}$			1.2	V
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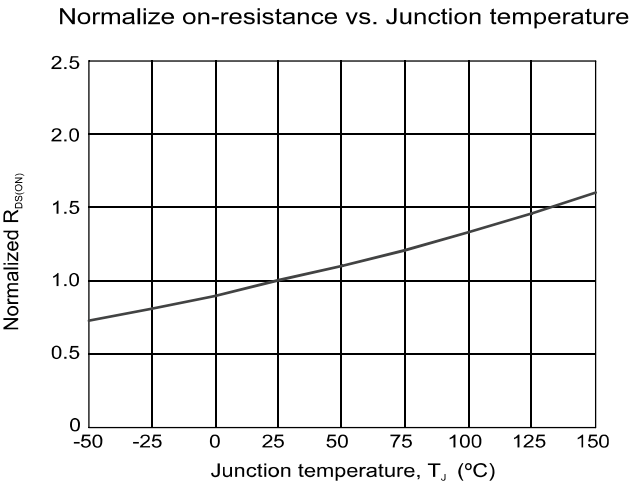
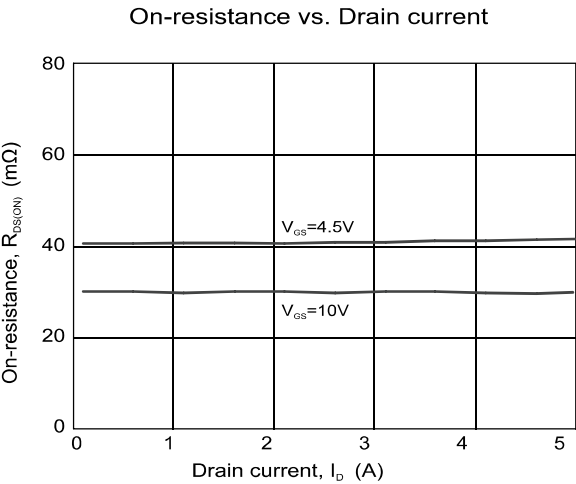
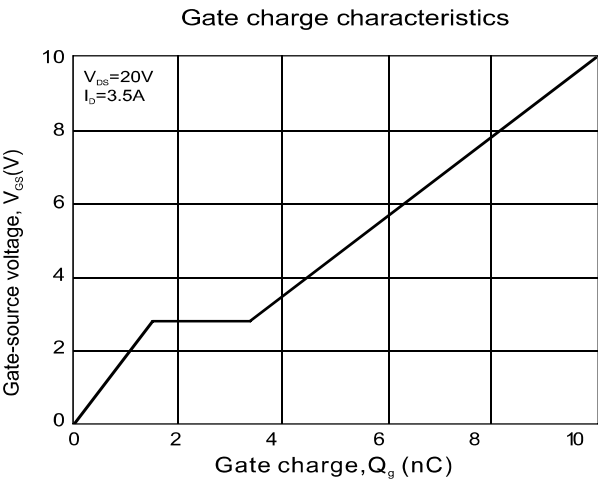
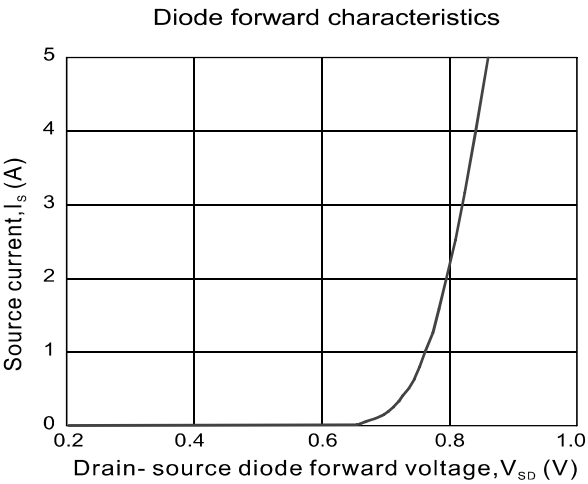
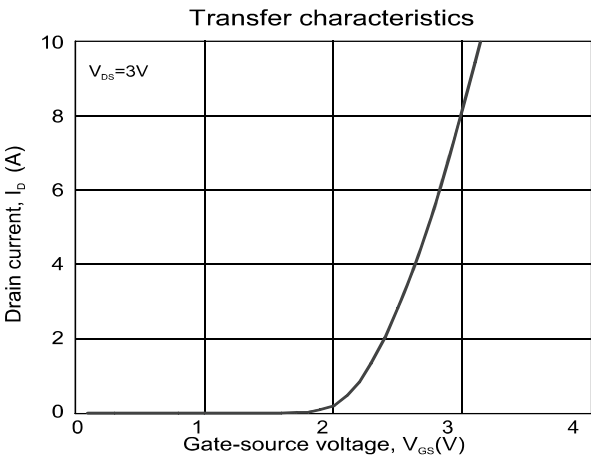
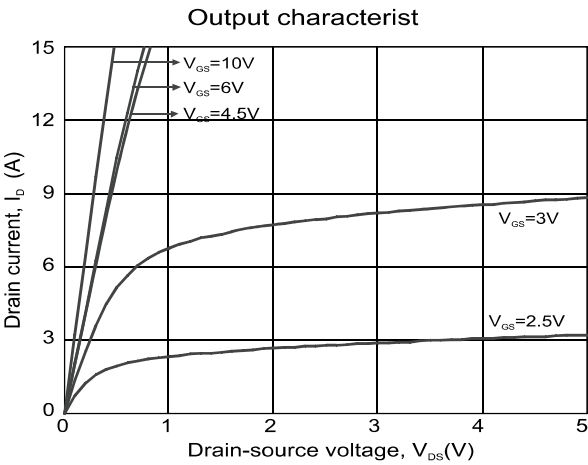
Note : 1.Repetitive rating : pulse width limited by junction temperature.

2.The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.

3.This value is guaranteed by design hence it is not included in the production test.

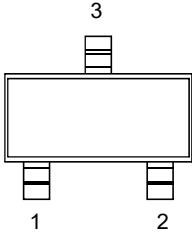
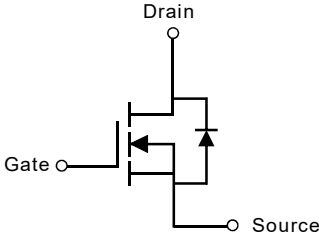
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Rating and characteristic curves



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Pinning information

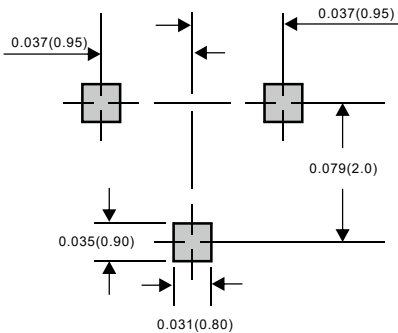
Pin	Simplified outline	Symbol
Pin 1 Gate Pin 2 Source Pin 3 Drain		

Marking

Type number	Marking Code
FMOS05N04-Q1-H	40N5

Suggested solder pad layout

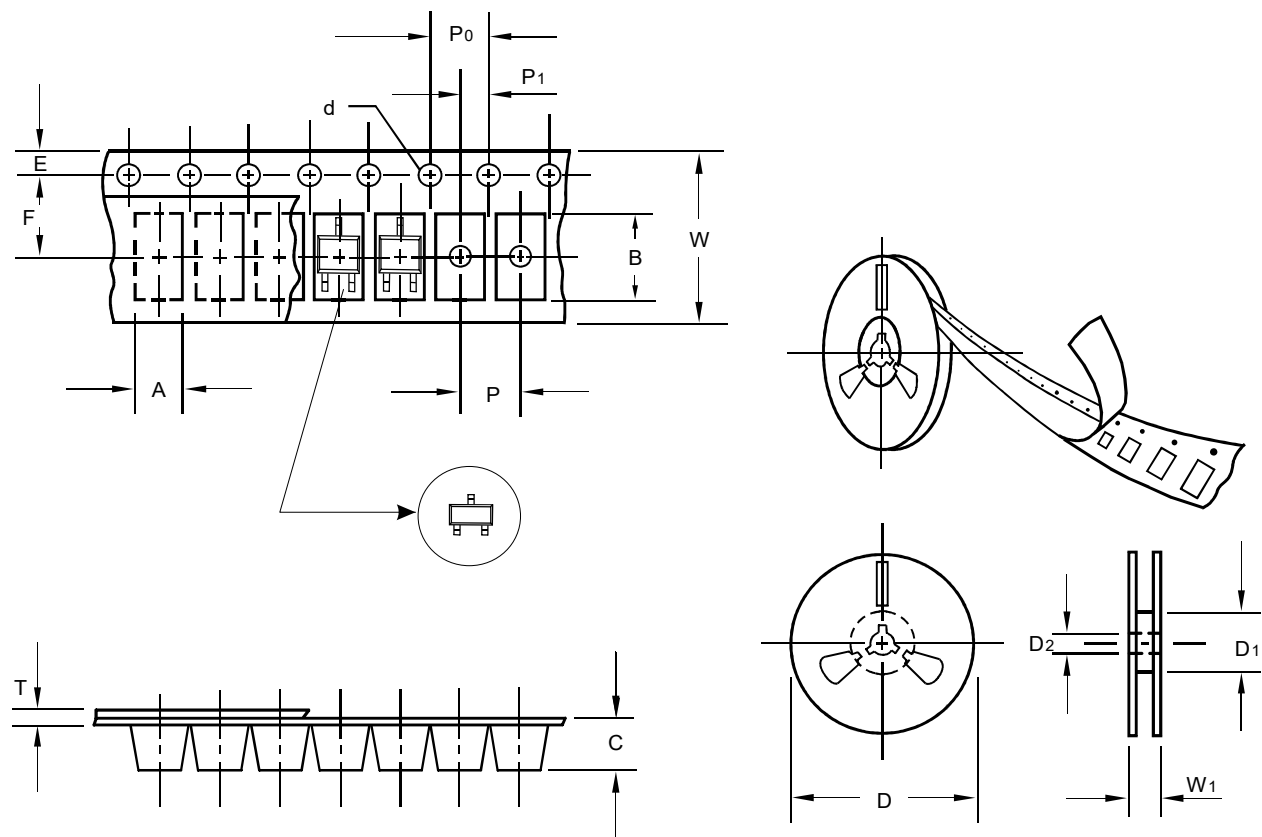
SOT-23



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	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	54.40
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.

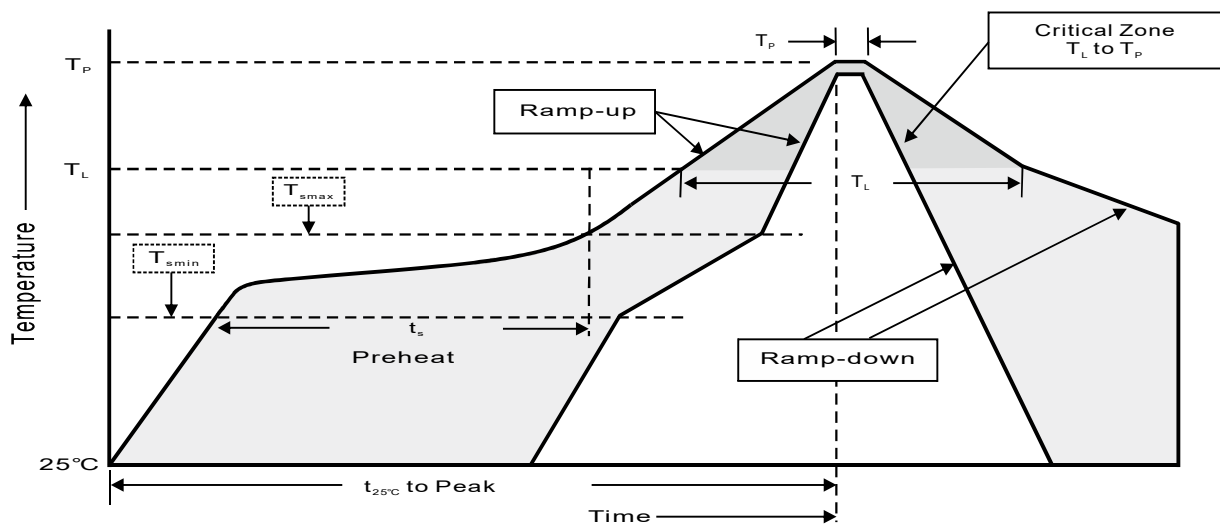
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Reel packing

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-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*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_{smin}) - Temperature Max (T_{smax}) - 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