

FMOSJ002N05E

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FMOSJ002N05E

0.2A, 50V N-Channel MOSFET

Features

- $R_{DS(ON)} = 2.5\Omega$ (Max.) @ $V_{GS}=10V$.
 $R_{DS(ON)} = 3.5\Omega$ (Max.) @ $V_{GS}=4.5V$.
- Advanced trench process technology.
- Surface mount package.
- ESD Protected.
- Green device available.
- Lead-free parts for green partner, exceeds environmental standards of MIL-STD-19500 /228
- Suffix "-H" indicates Halogen-free part, ex. FMOSJ002N05E-H.

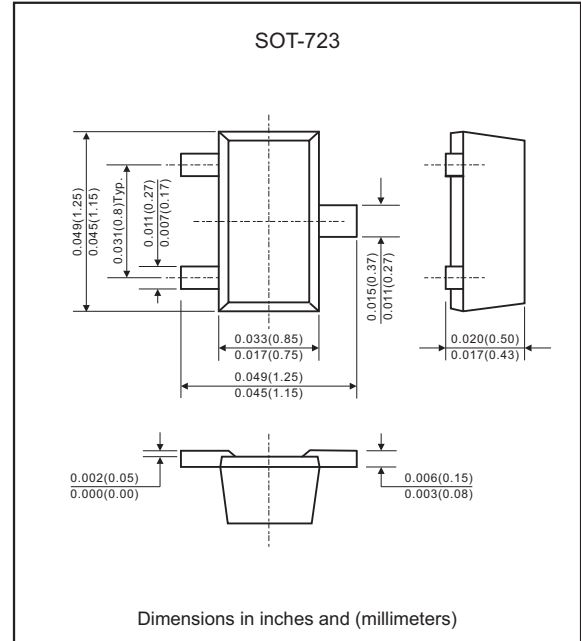
Applications

- Battery protection.
- Solid state relays driver.
- Relay.
- Displays.
- Memories.

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-723
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any

Package outline



Maximum ratings (AT $T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	50	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain Current	I_D	0.2	A
Pulsed drain current	I_{DM}	0.8	A
Power dissipation ($T_a=25^\circ\text{C}$)	P_D	0.15	W
Operating Junction temperature range	T_j	+150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$
Thermal resistance Junction to ambient (Note 1)	$R_{\theta JA}$	833	$^\circ\text{C/W}$

Notes :

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance when the case thermal reference is defined as the solder mounting surface of the drain pins. mounted on a 1 inch square pad of copper.

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	50			V
Drain-source leakage current	I _{DSS}	V _{DS} =50V, V _{GS} =0V, T _j =25°C		0.01	1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V		±3	±10	μA
On characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250μA	0.6	1.0	1.5	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =0.2A			2.5	Ω
		V _{GS} =4.5V, I _D =0.2A			3.5	
		V _{GS} =2.5V, I _D =0.1A			13	
Dynamic parameters						
Total gate charge	Q _g	V _{GS} =4.5V, V _{DS} =25V, I _D =0.2A (Note 1.2)		0.63	1	nC
Gate-source charge	Q _{gs}			0.2		
Gate-drain charge	Q _{gd}			0.23		
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =25V, f=1.0MHZ			50	pF
Out capacitance	C _{oss}				10	
Reverse transfer capacitance	C _{rss}				5	
Switching parameters						
Turn-on delay time	t _{d(on)}	V _{DS} =25V, V _{GS} =10V, R _G =6Ω, I _D =0.3A (Note 1.2)		2.2	5	ns
Rise time	t _r			19.2	38	
Turn-off delay time	t _{d(off)}			6.2	12	
Fall time	t _f			23	50	
Source-drain diode ratings and characteristics						
Continuous Drain-source Forward current	I _S				200	mA
Drain-source diode forward voltage	V _{SD}	I _S =0.3A, V _{GS} =0V		0.86	1.5	V

Notes :

1. Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics (FMOSJ002N05E)

Fig.1 On-Region Characteristics

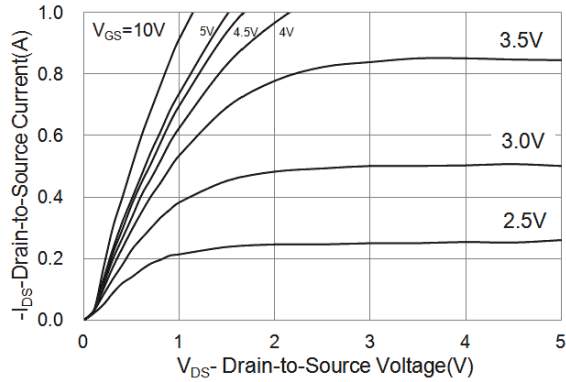


Fig.2 Transfer Characteristics

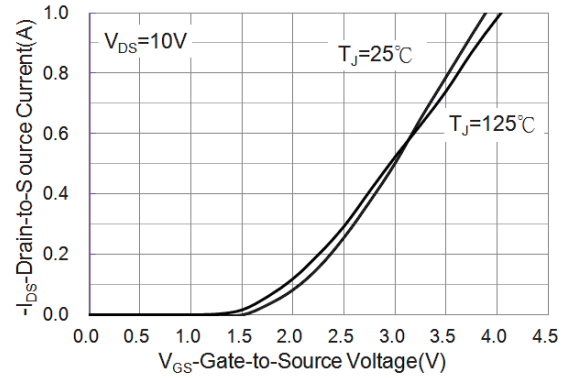


Fig.3 On-Resistance vs. Drain Current

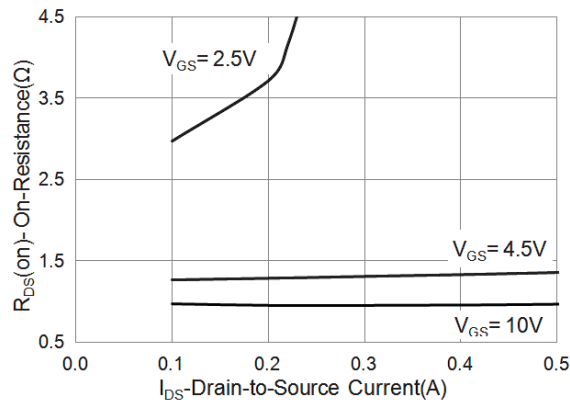


Fig.4 On-Resistance vs. Junction temperature

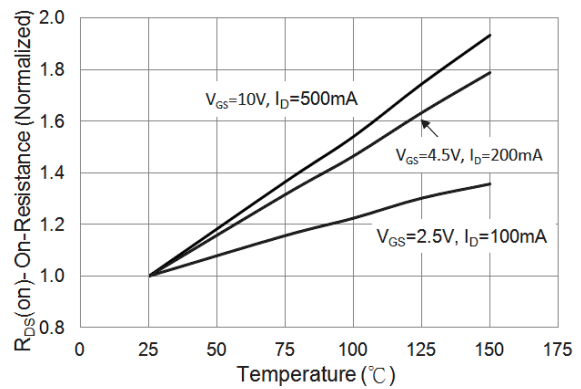


Fig.5 On-Resistance Variation with V_GS.

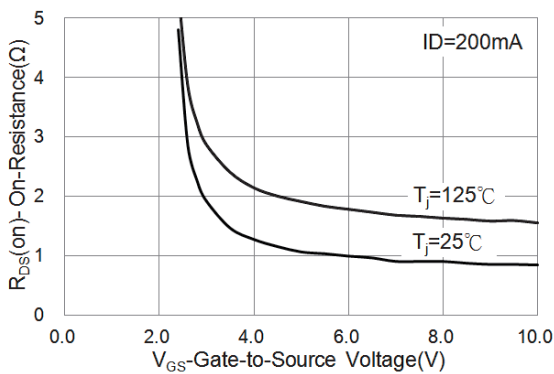
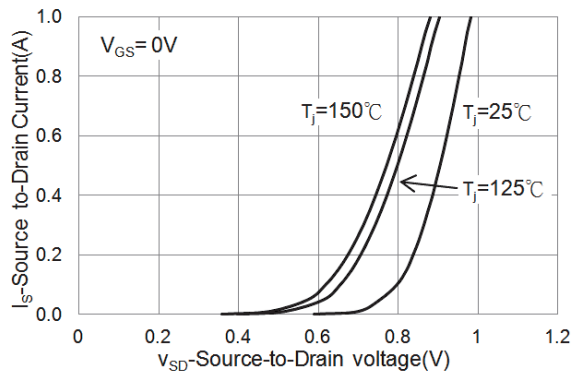


Fig.6 Body Diode Characteristics



Typical Performance Characteristics (FMOSJ002N05E)

Fig.7 Gate-Charge Characteristics

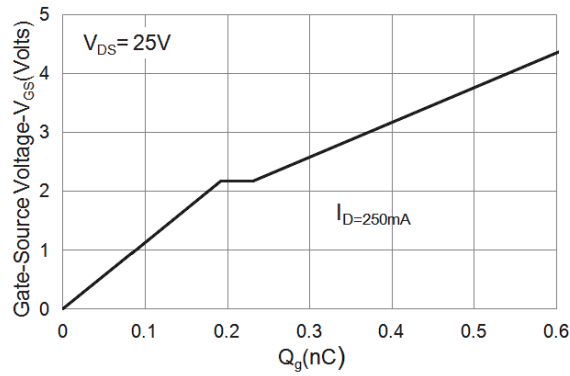


Fig.8 Breakdown Voltage Variation vs. Temperature

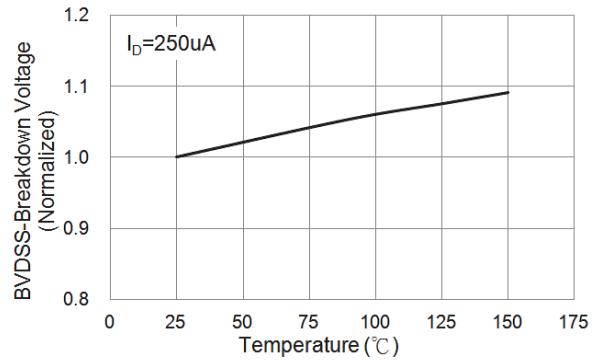
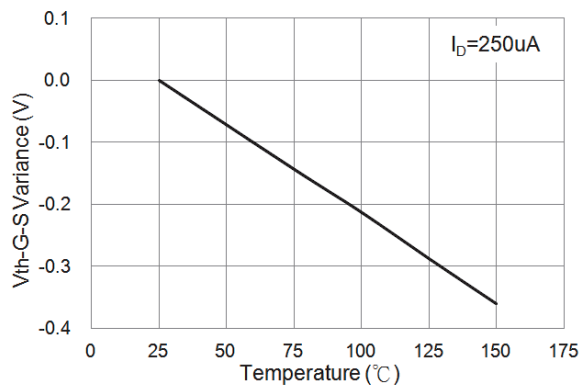
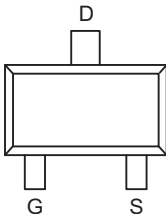
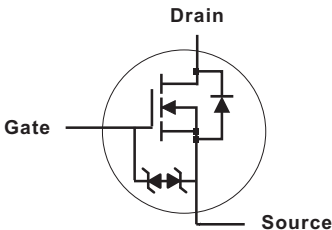


Fig.9 Threshold Voltage Variation with Temperature.



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Pinning information

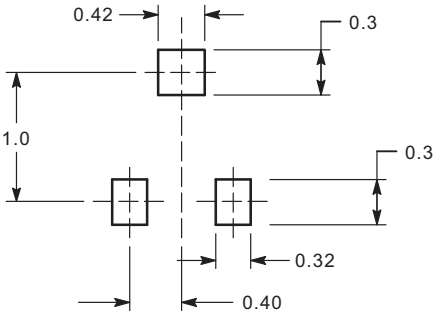
Pin	Simplified outline	Symbol
PinD Drain PinG Gate PinS Source		

Marking

Type number	Marking code
FMOSJ002N05E	5N

Suggested solder pad layout

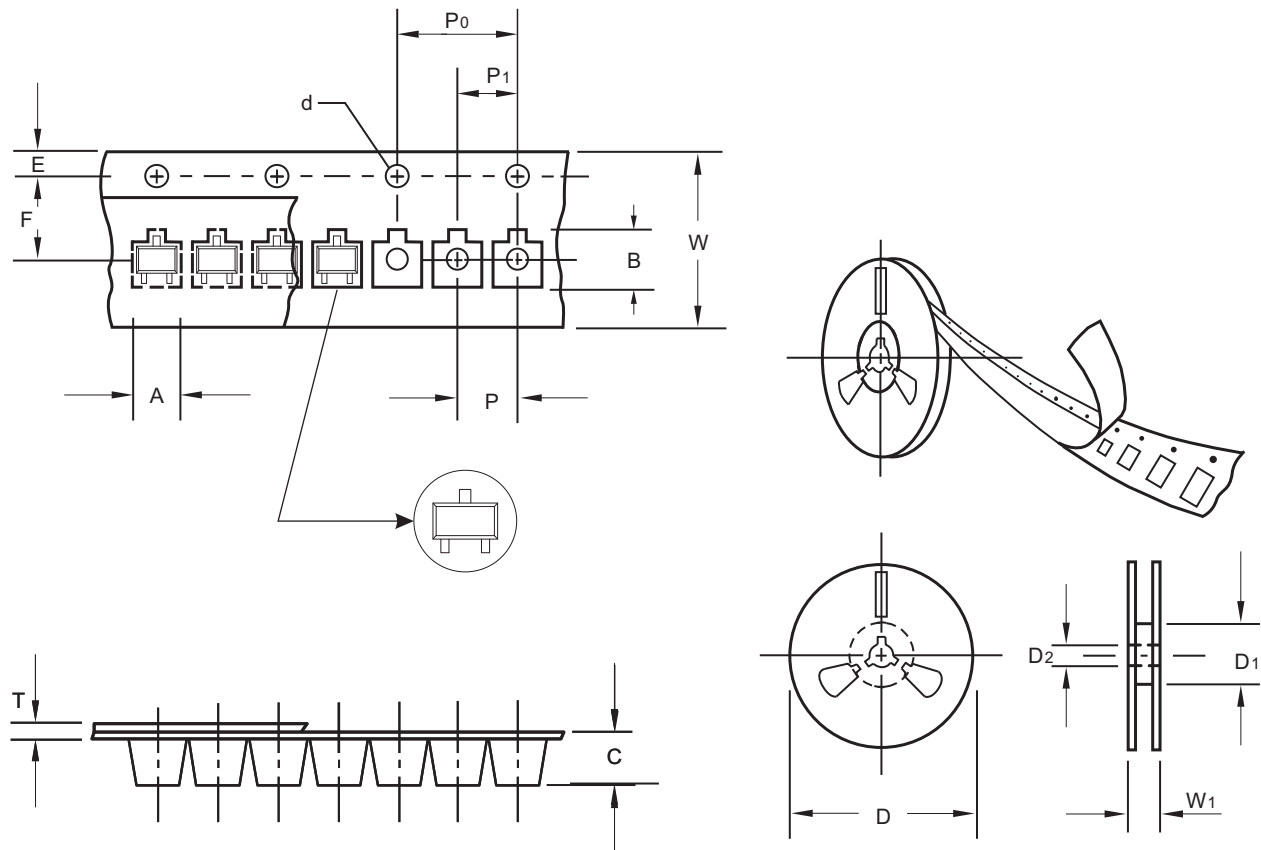
SOT-723



DIMENSIONS: MILLIMETERS

FMOSJ002N05E

Packing information



unit:mm

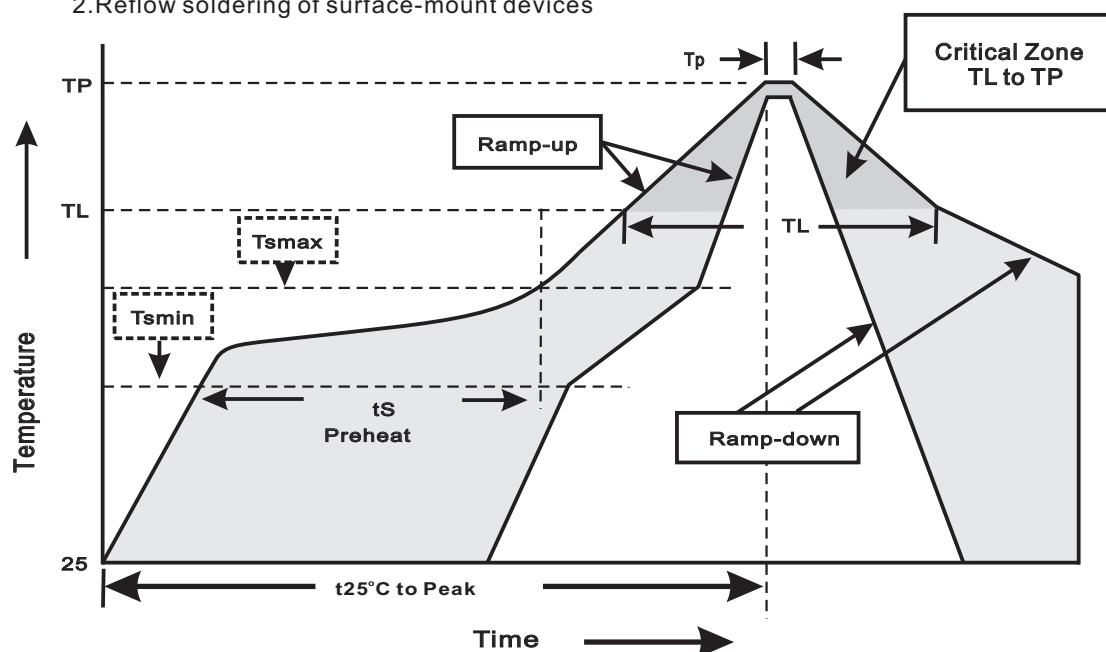
Item	Symbol	Tolerance	SOT-723
Carrier width	A	0.1	1.33
Carrier length	B	0.1	1.45
Carrier depth	C	0.1	0.61
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	54.40
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	3.50
Punch hole pitch	P	0.1	2.00
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	12.30

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

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-723	7"	8,000	2.0	80,000	183*183*123	178	382*262*387	640,000

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



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