FMOS014N02E

List

FMOS014N02E

1.0A, 20V N-Channel Enhancement Mode MOSFET

Features

- V_{DS} = 20V, I_D = 1.0A.
- $R_{DS(ON)} \leq$ 230mΩ @V_{GS}=4.5V, I_D=550mA.
- $R_{DS(ON)} \leq$ 305mΩ @V_{GS}=2.5V, I_D=450mA.
- $R_{DS(ON)} \leq$ 455mΩ @V_{GS}=1.8V, I_D=350mA.
- Fast switching speed.
- Reliable and rugged.
- ESD Protection.
- RoHS compliant & Halogen - Free.
- Suffix "-H" indicates Halogen-free part, ex.FMOS014N02E-H.

Applications

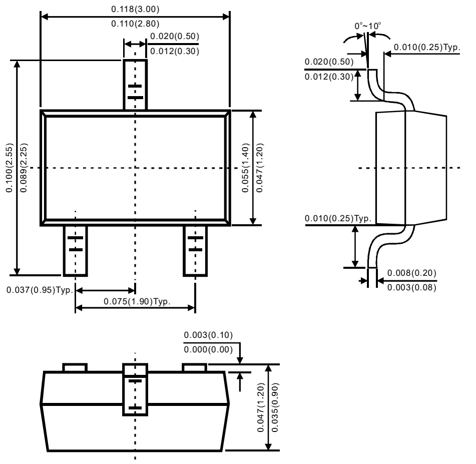
- DC / DC Converters.
- Small signal switch.
- Load switch.

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}	20	V
Gate-source voltage	V_{GS}	±8	V
Continuous drain current (T_A=25℃)	I_D	1.0	A
(T_A=70℃)		0.8	
Diode continuous forward current	I_S	0.4	A
Pulse drain current tested (Note 1)	I_{DM}	2.5	A
Power dissipation (T_A=25℃)	P_D	360	mW
Thermal resistance form junction to ambient (Note 2)	$R_{\theta JA}$	350	℃/W
Operating Junction temperature range	T_j	+150	℃
Storage temperature range	T_{STG}	-55 to +150	℃

Electrical characteristics (At T_j=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	20			V
Drain-source leakage current	I_{DSS}	V_{DS}=16V, V_{GS}=0V			1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±10	μA
On characteristics						
Gate threshold voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	0.5		1.0	V
Forward transconductance	g_{FS}	V_{DS}=5V, I_D=550mA		1.7		S
Static drain-source on-resistance (Note 3)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=550mA		190	230	mΩ
		V_{GS}=2.5V, I_D=450mA		234	305	
		V_{GS}=1.8V, I_D=350mA		303	455	
Dynamic Parameters (Note 4)						
Gate resistance	R_G	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		198		Ω
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=10V, f=1.0MHz		43		pF
Output capacitance	C_{oss}			9		
Reverse transfer capacitance	C_{rss}			6		
Switching parameters						
Total gate charge	Q_g	V_{GS}=4.5V, V_{DS}=10V, I_D=1A		2		nC
Gate to source charge	Q_{gs}			0.3		
Gate to Drain charge	Q_{gd}			0.3		
Turn-on delay time	$t_{d(on)}$	V_{DS}=10V, V_{GS}=4.5V, I_D=2A, R_G=6Ω		1.2		ns
Rise time	t_r			25		
Turn-off delay time	$t_{d(off)}$			14		
Fall time	t_f			15		
Source-drain diode ratings and characteristics						
Reverse recovery time	t_{rr}	I_F=1A, V_R=0V, dI_F/dt=100A/μs		9.2		ns
Reverse recovery charge	Q_{rr}			0.8		nC
Drain - source diode forward voltage (Note 3)	V_{SD}	V_{GS}=0V, I_{SD}=1mA		0.9	1.1	V

Note : 1. Max. Current is limited by junction temperature.
2. Surface mounted on 1 in^2 FR4 borad with 1oz.
3. Pulse test (Pulse width ≤ 300μs, duty cycle ≤ 2%).
4. Guaranteed by design, not subject to production testing.

Rating and characteristic curves

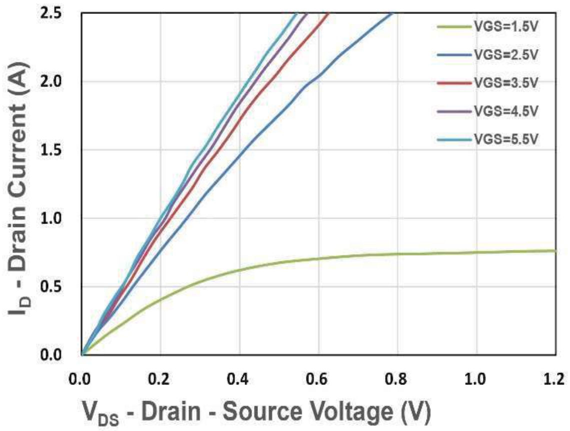


Figure 1. Output Characteristics

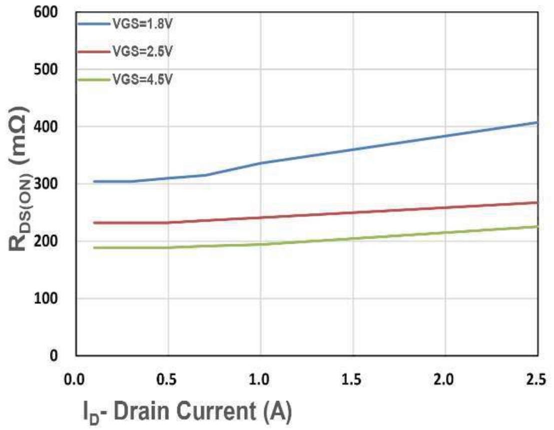


Figure 2. On-Resistance vs. ID

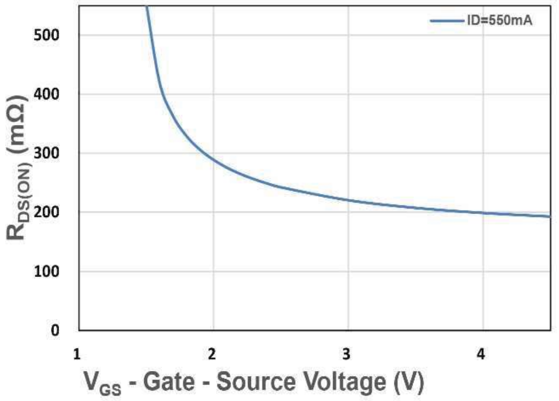


Figure 3. On-Resistance vs. VGS

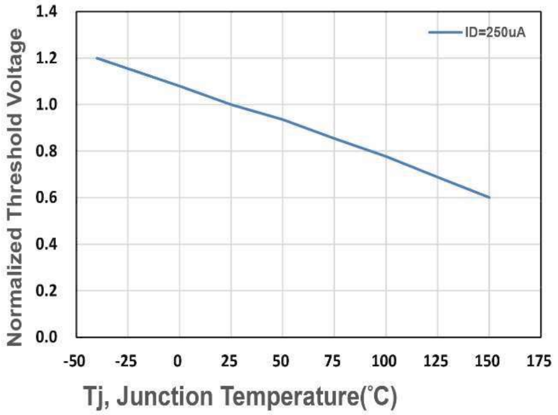


Figure 4. Gate Threshold Voltage

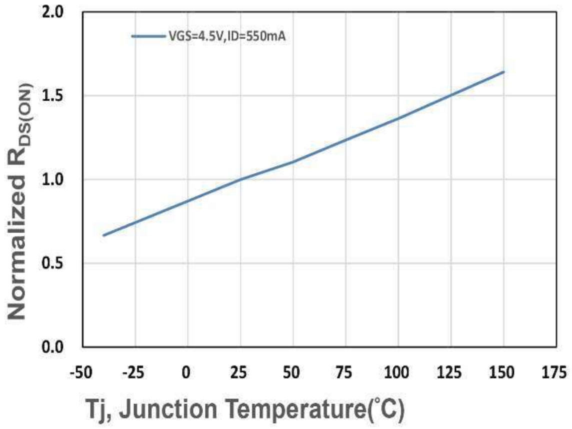


Figure 5. Drain-Source On Resistance

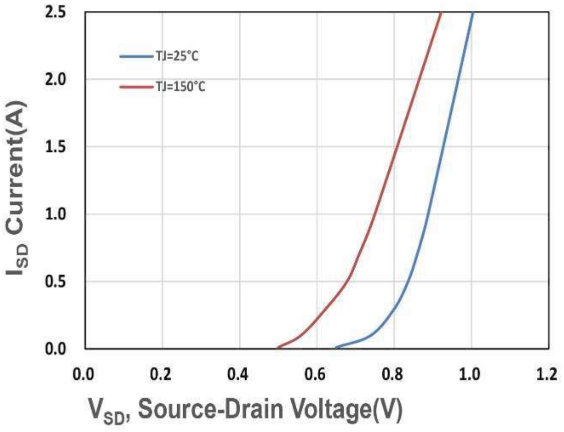


Figure 6. Source-Drain Diode Forward

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Rating and characteristic curves

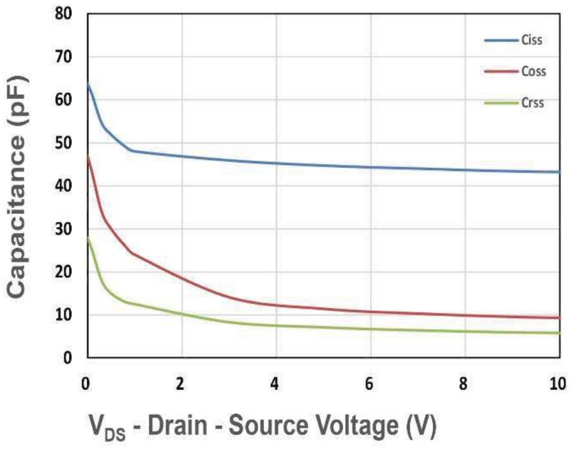


Figure 7. Capacitance

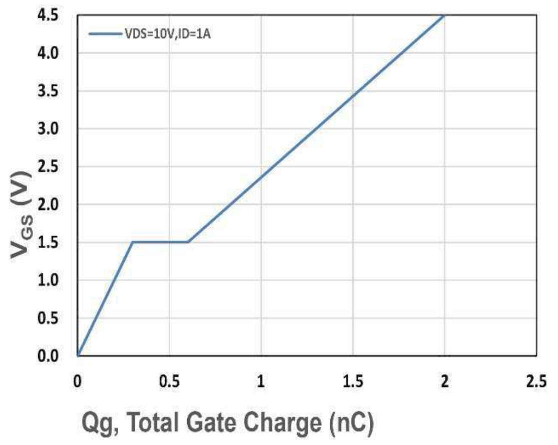


Figure 8. Gate Charge Characteristics

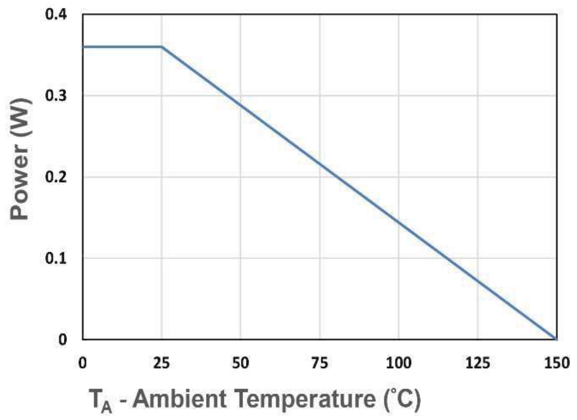


Figure 9. Power Dissipation

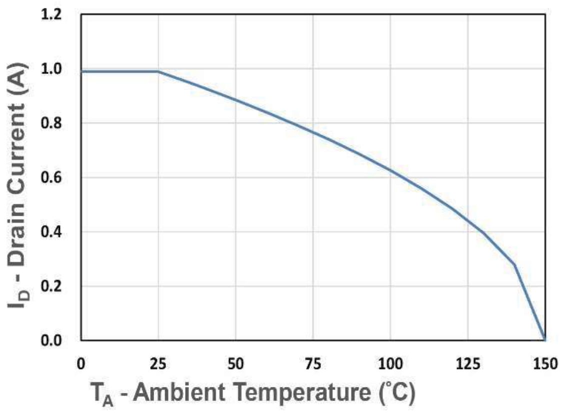


Figure 10. Drain Current

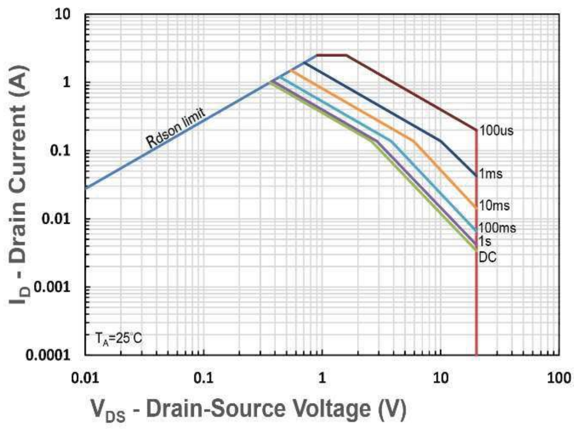


Figure 11. Safe Operating Area

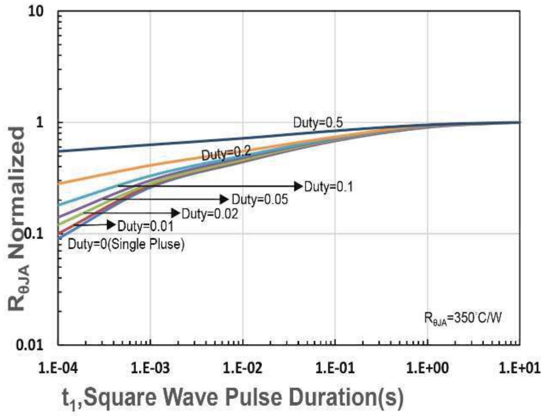
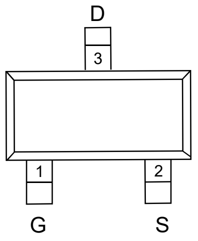
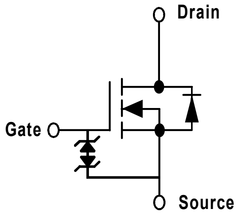
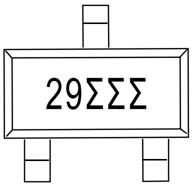


Figure 12. RθJA Transient Thermal Impedance

Pinning information

Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Source Pin3 Drain		

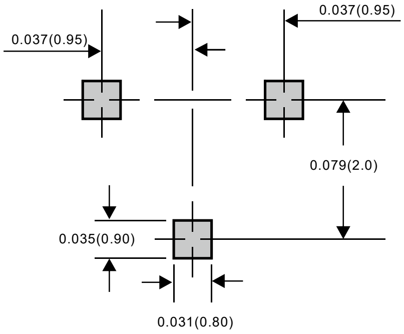
Marking



Σ Σ Σ : Date Code

Suggested solder pad layout

SOT-23



Dimensions in inches and (millimeters)

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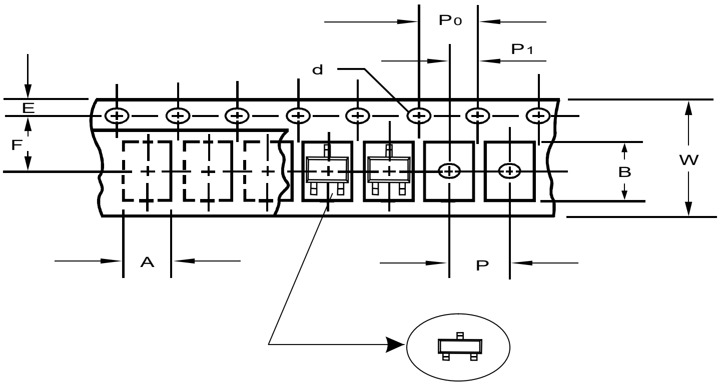
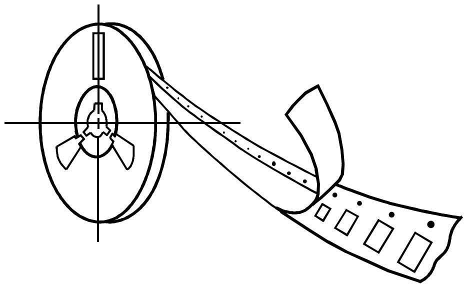
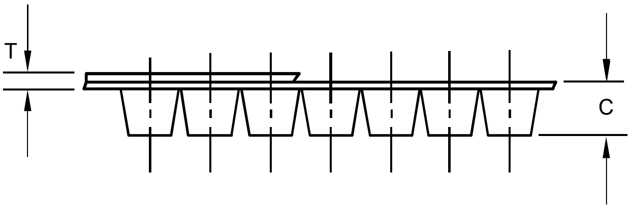
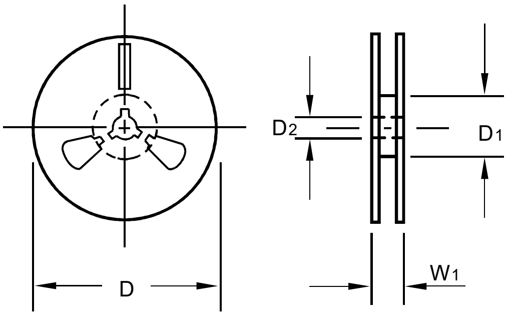
Packing information









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	D_1	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D_1	min	54.40
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	11.40

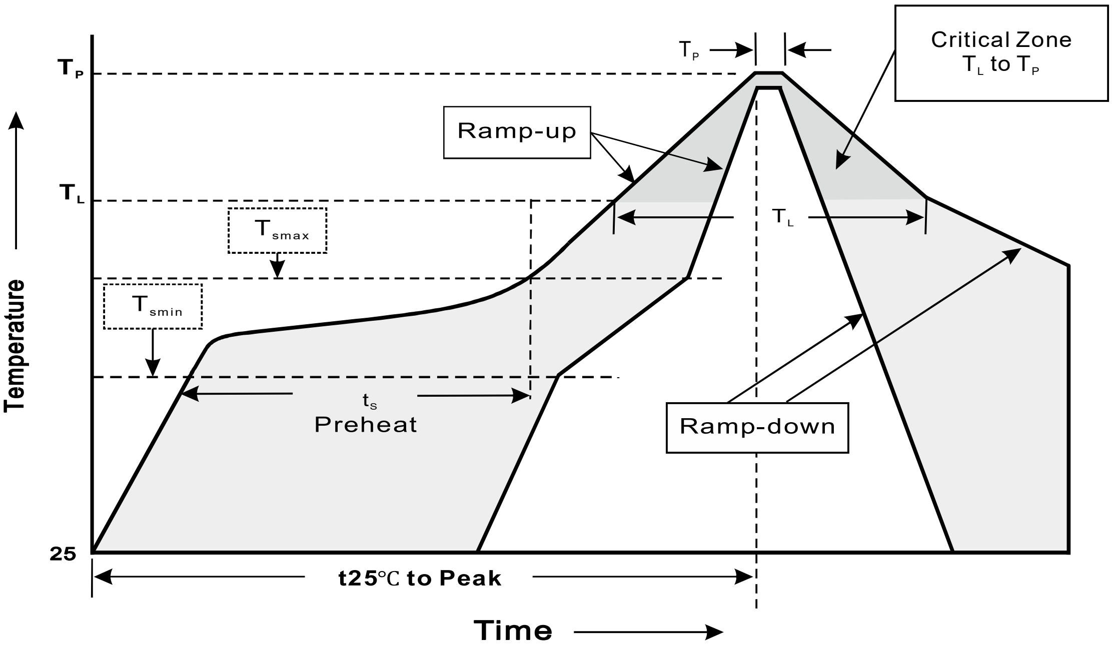
Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

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)	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℃~40℃ 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℃/sec
Prehaeat -Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max) (t_s)	150℃ 200℃ 60 ~120sec
T_{smax} to T_L -Ramp-up rate	$<$ 3℃/sec
Time maintained above: -Temperature (T_L) -Time(T_L)	217℃ 60 ~ 260 sec
Peak Temperature(T_P)	255℃ -0/+5℃
Time within 5℃ of actual peak Temperature(T_P)	10 ~ 30sec
Ramp-down rate	$<$ 6℃/sec
Time 25℃ to peak temperature	$<$ 6 minutes