

FMOSBSS138KW1

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FMOSBSS138KW1

0.35A 55V N-Channel Enhancement Mode MOSFET ESD Protection

Features

- $V_{DS} = 55V$, $I_D = 0.35A$.
- $R_{DS(ON)} < 1.5\Omega$ @ $V_{GS}=10V$, $I_D=0.35A$.
- $R_{DS(ON)} < 2.3\Omega$ @ $V_{GS}=4.5V$, $I_D=0.2A$.
- Low input capacitance.
- Fast switching speed.
- ESD protected 2kV HBM.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMOSBSS138KW1-H.

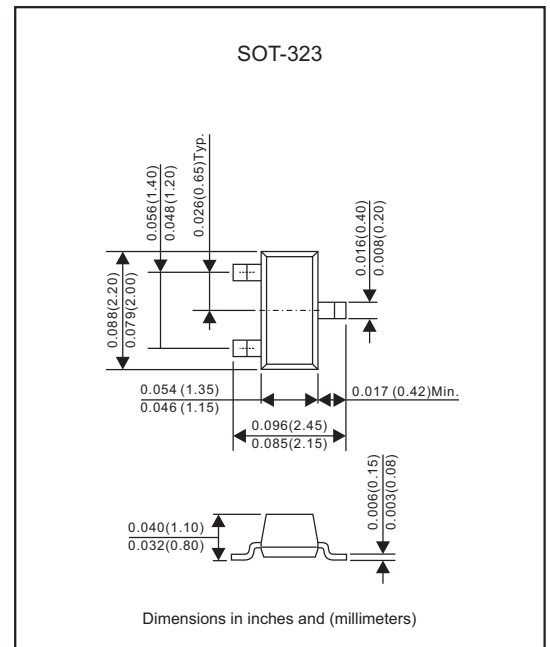
Applications

- Direct logic-level interface: TTL/CMOS.
- Drivers : relays, solenoids, lamps, hammers, display, Memories, transistors, etc.
- Battery operated systems.
- Solid-state relays.
- Backlighting.

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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	55	V
Gate-source voltage	V_{GS}	± 20	V
Drain current - Continuous (Note 1)	I_D	0.35	A
Drain Current - Pulsed (Note 2,3)	I_{DM}	1.2	A
Power dissipation (Note 4)	P_D	0.35	W
Thermal resistance form junction to ambient	$R_{\theta JA}$	357	$^\circ C/W$
Operating 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}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	55			V
Drain-source leakage current	I_{DSS}	$V_{DS}=55\text{V}$, $V_{GS}=0\text{V}$			0.8	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20\text{V}$, $V_{DS}=0\text{V}$			± 6	μA

On characteristics

Gate threshold voltage (Note 3)	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	0.6	0.75	1.0	V
Static drain-source on-resistance (Note3)	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=0.35\text{A}$		1.2	1.5	Ω
		$V_{GS}=4.5\text{V}$, $I_D=0.20\text{A}$		1.4	2.3	

Dynamic Parameters (Note 2)

Input capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=30\text{V}$, $f=1.0\text{MHz}$		23		pF
Output capacitance	C_{oss}			16		
Reverse transfer capacitance	C_{rss}			10		

Switching parameters (Note 3)

Total Gate Charge	Q_g	$V_{GS}=4.5\text{V}$, $V_{DS}=30\text{V}$, $I_D=0.2\text{A}$		0.63		nC
Gate to Source Charge	Q_{gs}			0.2		
Gate to Drain Charge	Q_{gd}			0.23		
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10\text{V}$, $V_{DD}=30\text{V}$, $I_D=0.2\text{A}$, $R_G=10\Omega$		1.7		ns
Rise time	t_r			17.0		
Turn-off delay time	$t_{d(off)}$			5.5		
Fall time	t_f			20.4		

Source-drain diode ratings and characteristics (Note 1)

Drain - source diode forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=0.35\text{A}$		0.92	1.35	V
Continuous source current	I_S	$V_G = V_G = 0\text{V}$, Force current			0.5	A
Pulsed source current	I_{SM}				1.0	

Note : 1. The data tested by surface mounted on a 1 inch² FR-4 PCB with 2oz copper.

2. Repetitive Rating: Pulsed width limited by maximum junction temperature.

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

4. The power dissipation is limited by 150°C junction temperature.

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Rating and characteristic curves

FIG.1 Drain Current VS. Junction Temperature

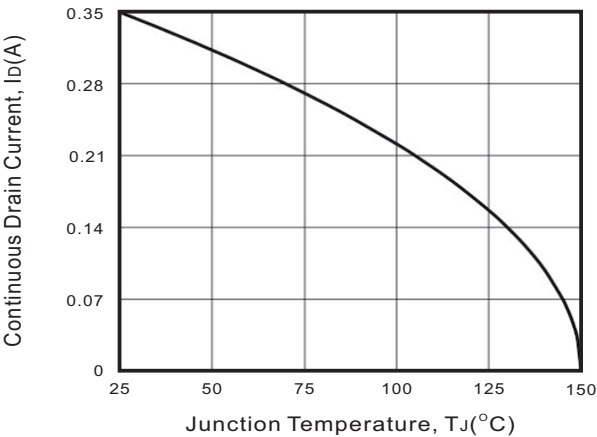


FIG.2 ON-Resistance VS. Junction Temperature

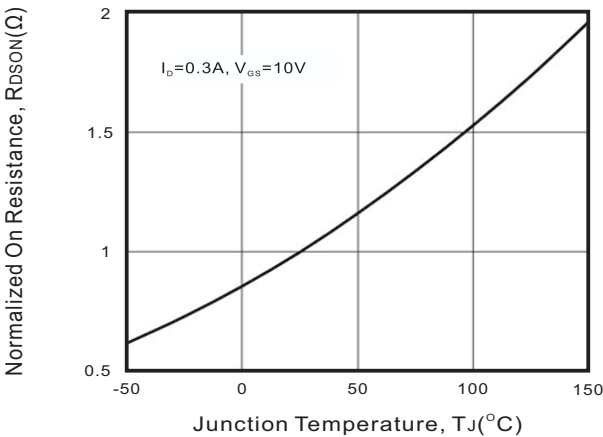


FIG.3 Gate Threshold Voltage

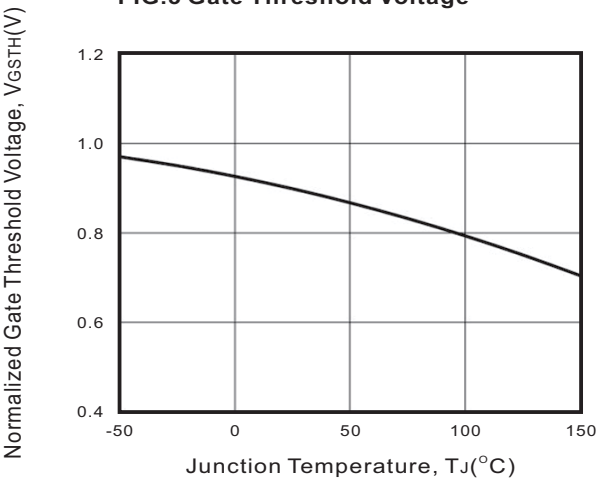


FIG.4 Capacitance

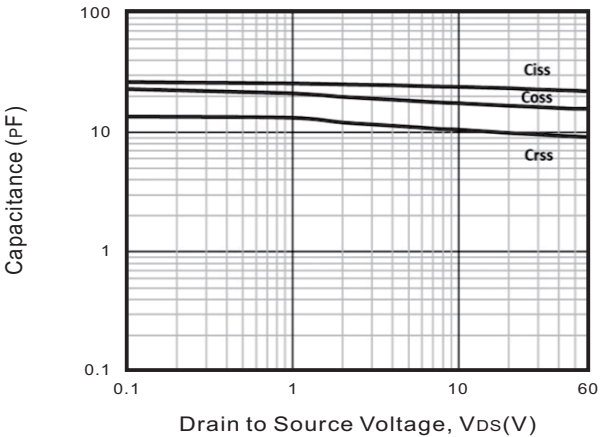


FIG.5 Safe Operation Area

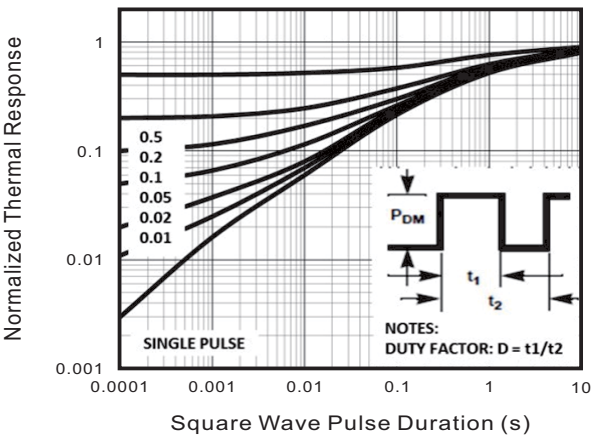
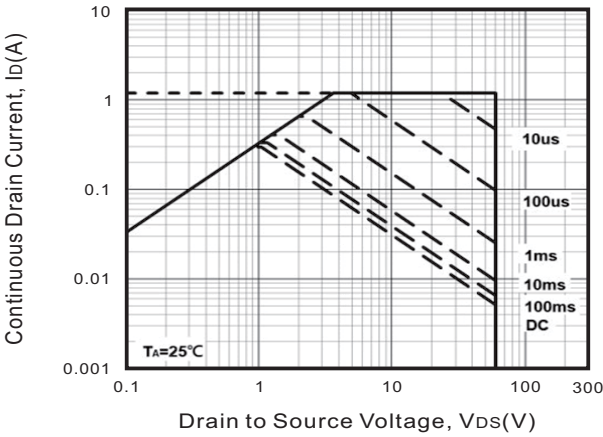
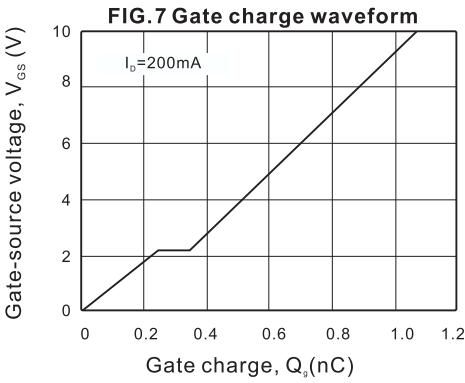


FIG.6 Transient Thermal Impedence



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Rating and characteristic curves



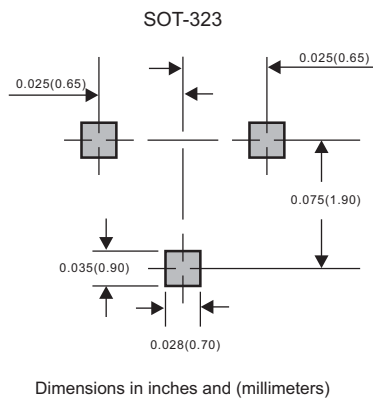
Pinning information

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

Marking

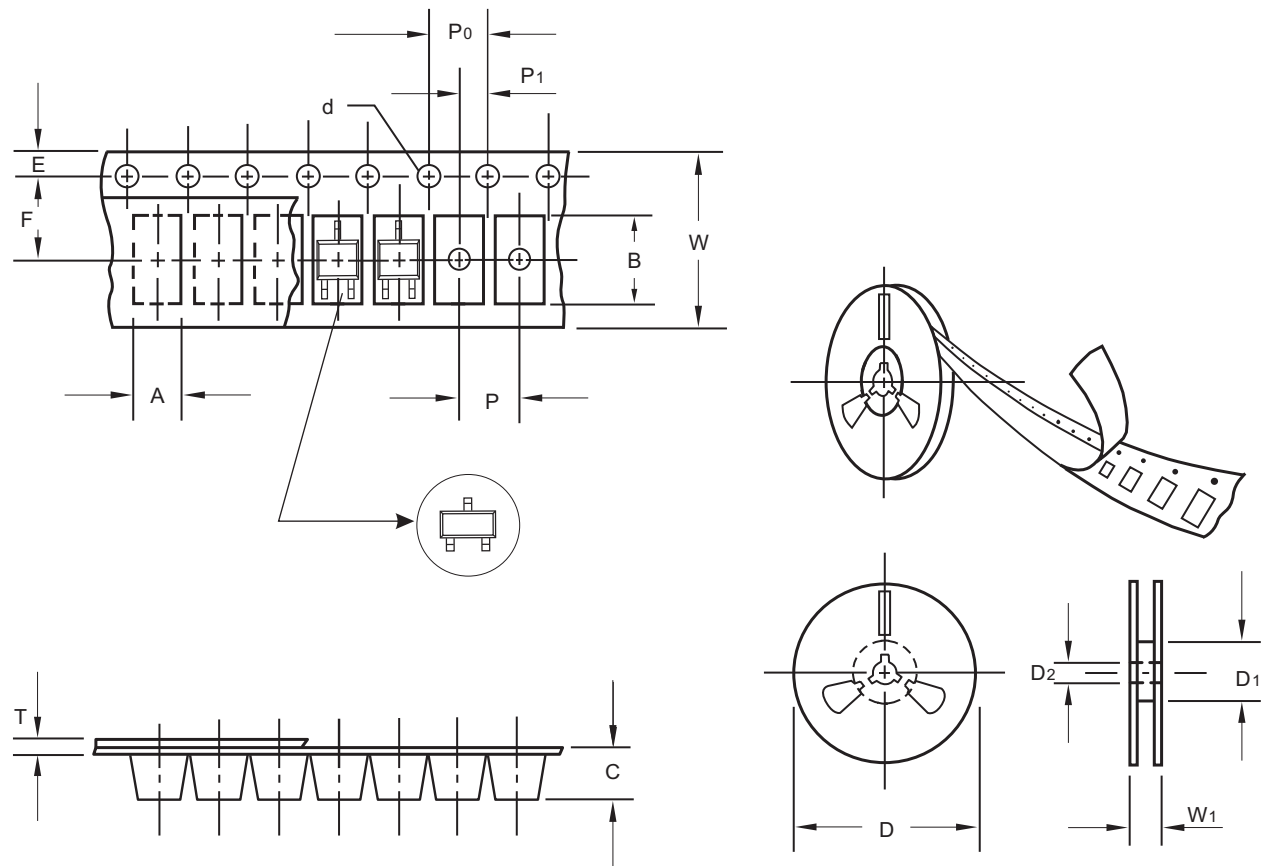
Type number	Marking code
FMOSBSS138KW1	K38V

Suggested solder pad layout



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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	D ₁	min	-
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D ₁	min	62.00
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	11.40

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

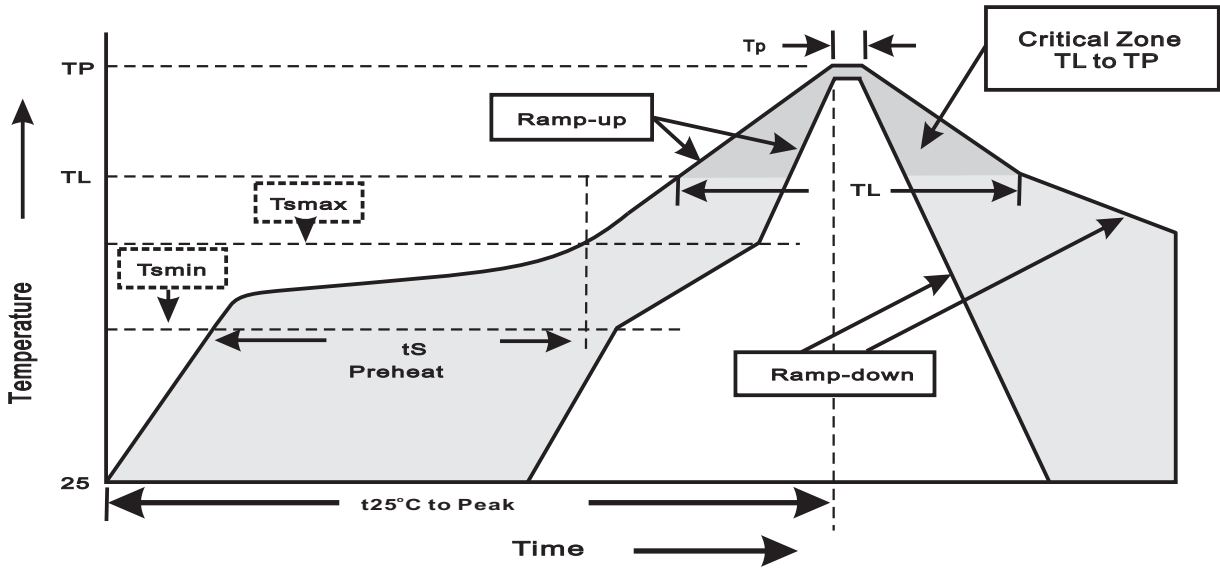
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Reel packing

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*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 60~120sec
T _{smax} 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