

FMSBSS138-H

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FMSBSS138-H

0.3A 55V N-Channel Enhancement Mode MOSFET ESD Protection

Features

- $V_{DS} = 55V$, $I_D = 0.30A$.
- $R_{DS(ON)} \leq 1.5\Omega$ @ $V_{GS} = 10V$, $I_D = 0.2A$.
- $R_{DS(ON)} \leq 2.5\Omega$ @ $V_{GS} = 4.5V$, $I_D = 0.1A$.
- Improved dv/dt capability.
- Fast switching.
- ESD protected: 2kV.
- Lead-free parts meet RoHS requirements.
- Halogen-free (IEC61249-2-21).

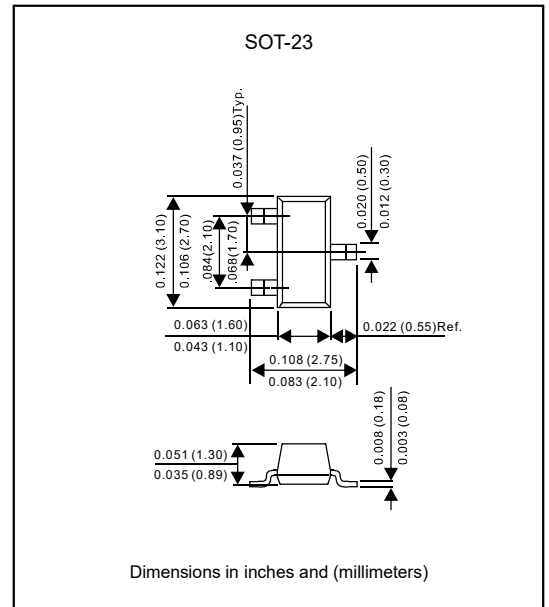
Applications

- Motor drive.
- Power tools.
- LED lighting.

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

Parameter	Symbol	Ratings	Unit
Drain-source voltage	V_{DS}	55	V
Gate-source voltage	V_{GS}	± 20	V
Continuous drain current ($T_A = 25^\circ C$) ($T_A = 70^\circ C$)	I_D	0.30	A
		0.16	
Pulse drain current (Note1)	I_{DM}	0.80	A
Power dissipation ($T_A = 25^\circ C$) (Derate above $25^\circ C$)	P_D	0.35	W
		0.003	W/ $^\circ C$
Thermal resistance, junction to ambient	$R_{\theta JA}$	357	$^\circ C/W$
Operating Junction temperature	T_J	+125	$^\circ C$
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 =250μA, V _{GS} =0V	55			V
Drain-source leakage current	I _{DSS}	V _{DS} =55V, V _{GS} =0V, T _J =25°C			1	μA
		V _{DS} =40V, V _{GS} =0V, T _J =125°C			100	
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±10	μA
On characteristics						
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	0.8	1.1	1.5	V
Static drain-source on-resistance	R _{DS(ON)}	V _{GS} =10V, I _D =0.2A		1.2	1.5	Ω
		V _{GS} =4.5V, I _D =0.1A		1.5	2.5	
Forward transconductance	g _{FS}	V _{DS} =10V, I _D =0.2A		0.5		S
Dynamic Parameters						
Input capacitance	C _{iss}	V _{GS} =0V, V _{DS} =30V, f=1.0MHz		25.5		pF
Output capacitance	C _{oss}			17		
Reverse transfer capacitance	C _{rss}			7.8		
Switching parameters						
Total gate charge (Note2, 3)	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =0.2A		3.7		nC
Gate to source charge (Note2, 3)	Q _{gs}			0.9		
Gate to Drain charge (Note2, 3)	Q _{gd}			0.4		
Turn-on delay time (Note2, 3)	t _{d(on)}	V _{DD} =30V, V _{GS} =10V, I _D =0.2A, R _G =6Ω		3		ns
Rise time (Note2, 3)	t _r			5		
Turn-off delay time (Note2, 3)	t _{d(off)}			14		
Fall time (Note2, 3)	t _f			9		
Source-drain diode ratings and characteristics						
Drain - source diode forward voltage	V _{SD}	I _S =0.2A, V _{GS} =0V, T _J =25°C			1.4	V
Reverse recovery time	I _s	V _G =V _D =0V, Force current			0.3	A
Reverse recovery charge	I _{SM}				0.6	A

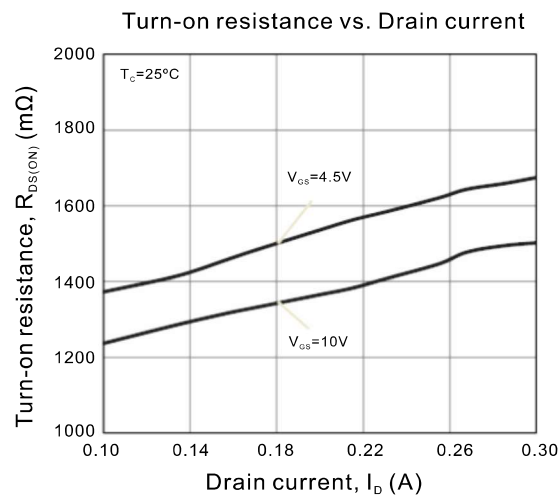
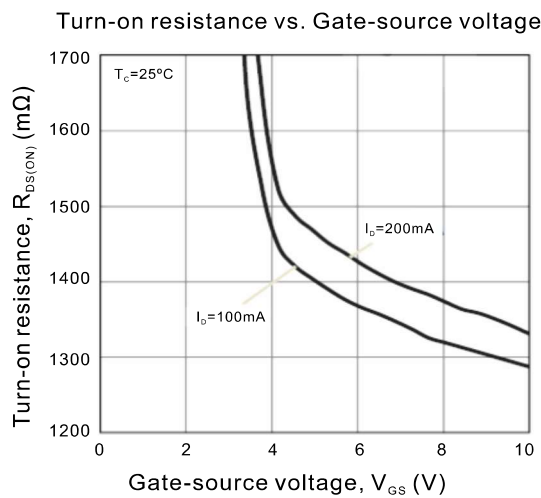
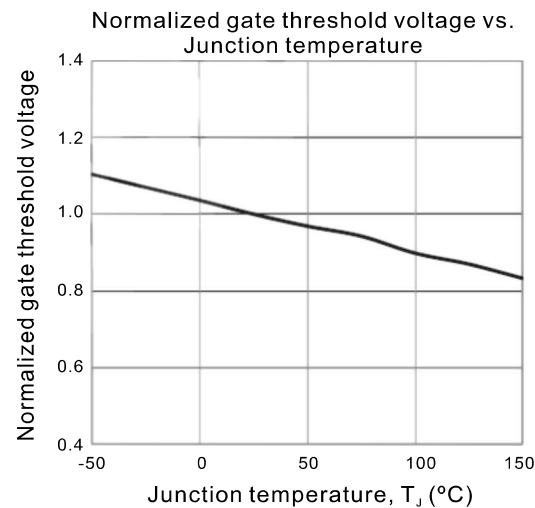
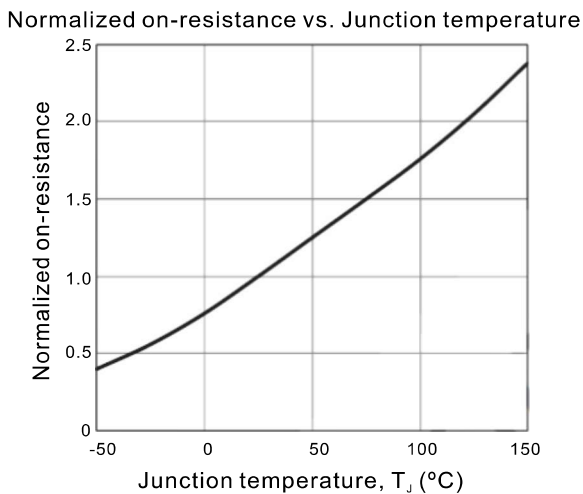
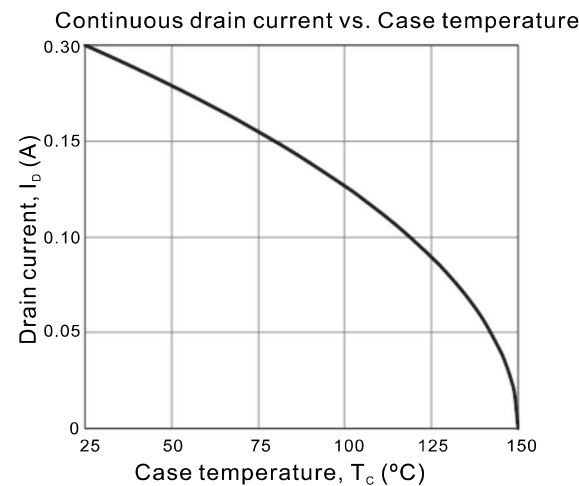
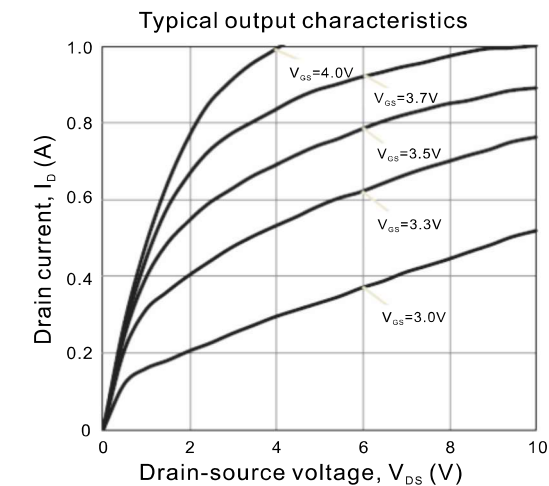
Note: 1. Repetitive rating: pulsed width limited by maximum junction temperature.

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

3. Essentially independent of operating temperature.

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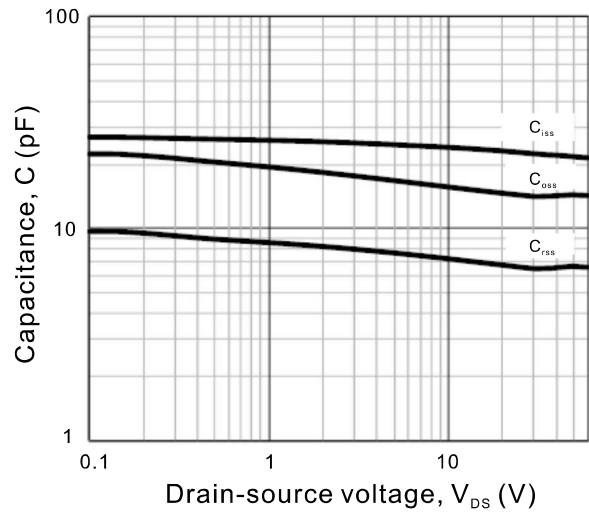
Rating and characteristic curves



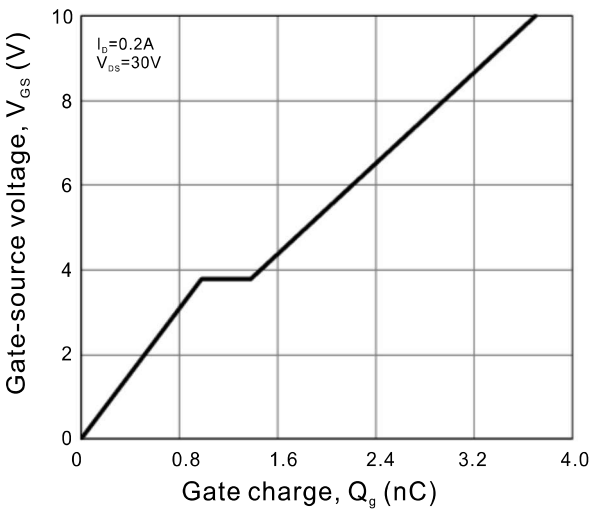
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Rating and characteristic curves

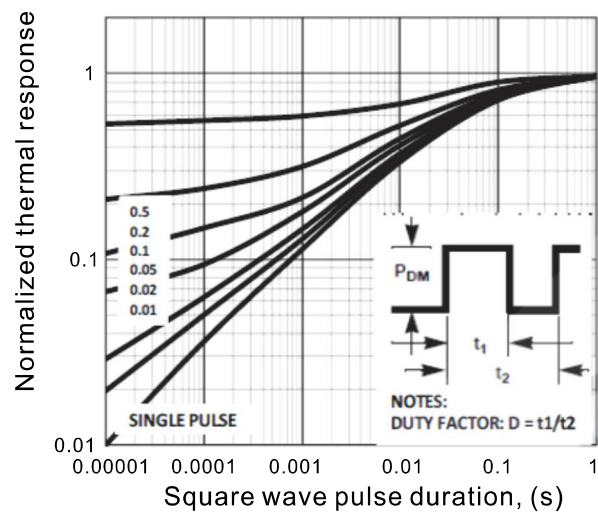
Capacitance characteristics



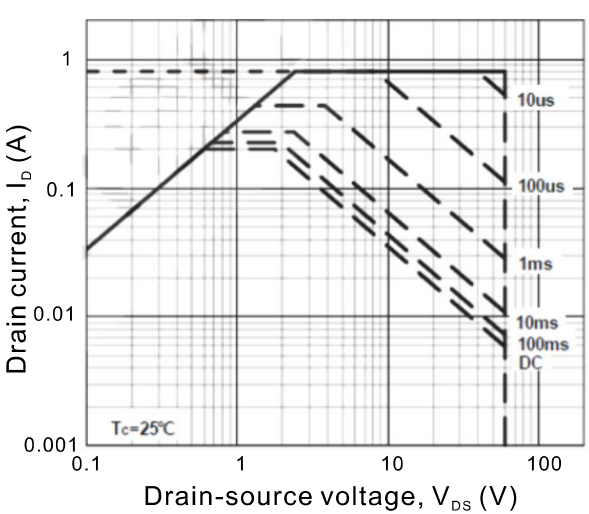
Gate charge characteristics



Normalized transient

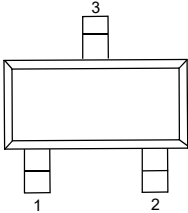
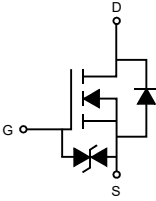


Maximum safe operation area



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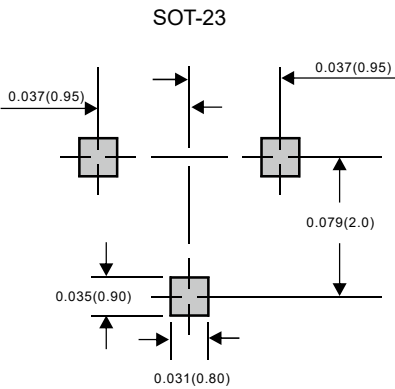
Pinning information

Pin	Simplified outline	Symbol
Pin1 Gate Pin2 Source Pin3 Drain		

Marking

Type number	Marking code
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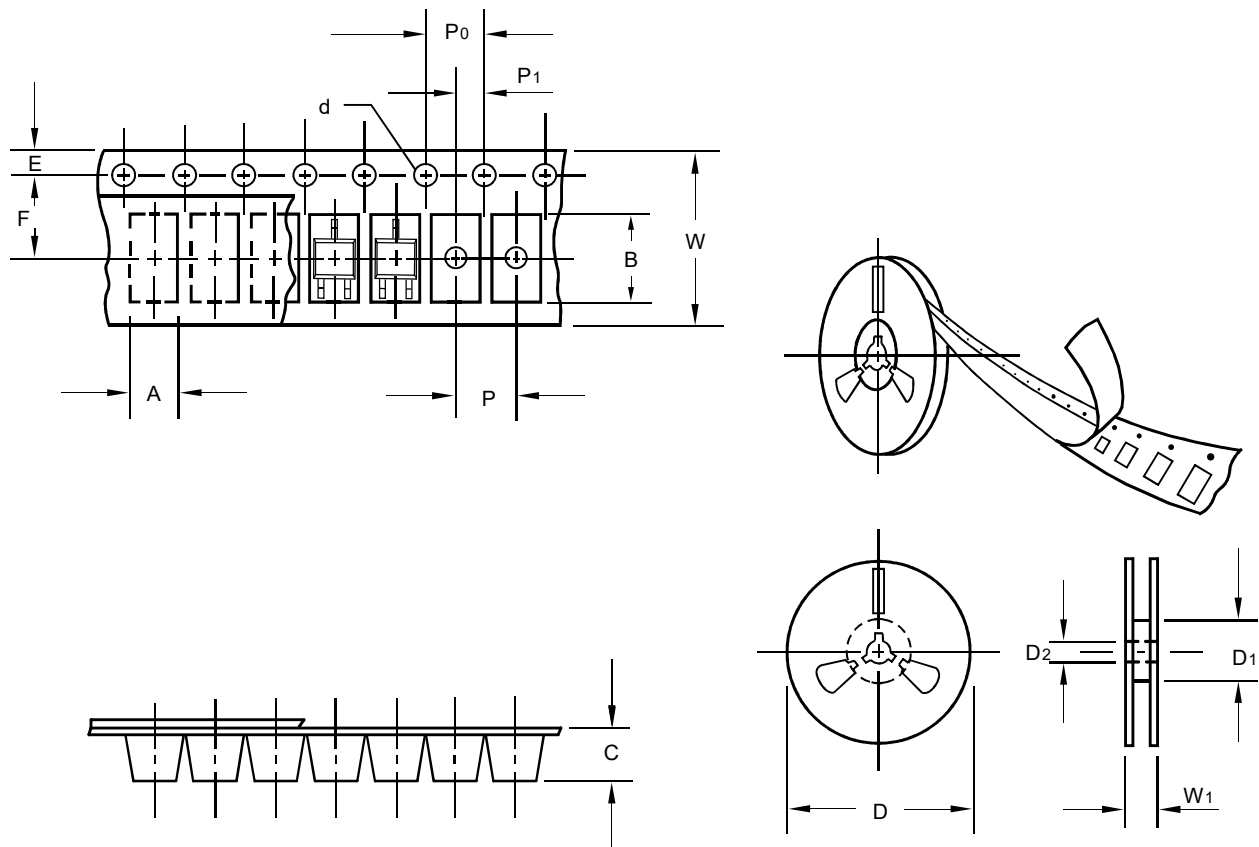
Suggested solder pad layout



Dimensions in inches and (millimeters)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.5	3.15
Carrier length	B	0.5	2.77
Carrier depth	C	0.5	1.22
Sprocket hole	d	0.5	1.50
13" Reel outside diameter	D	5.0	-
13" Reel inner diameter	D1	min	-
7" Reel outside diameter	D	5.0	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
Tape width	W	0.5	8.00
Reel width	W1	5.0	12.30

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

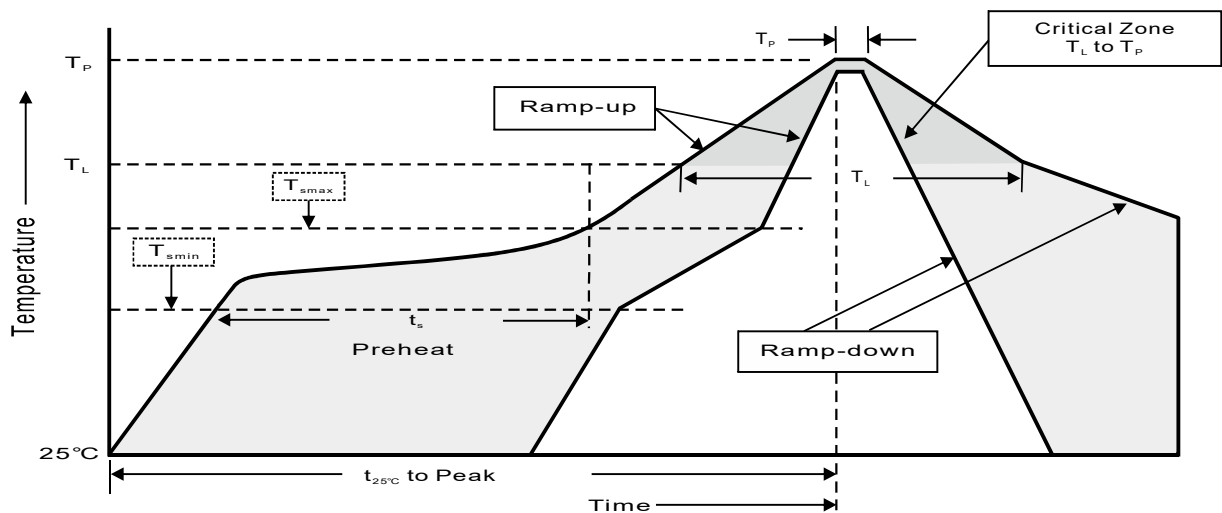
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Reel packing

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_{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