

FFM301-Q1 THRU FFM307-Q1

List

List.....	1
Package outline.....	2
Features.....	2
Mechanical data.....	2
Maximum ratings and Electrical characteristics	2
Rating and characteristic curves.....	3
Pinning information.....	4
Marking.....	4
Suggested solder pad layout.....	4
Packing information.....	5
Reel packing.....	6
Suggested thermal profiles for soldering processes.....	6
High reliability test capabilities.....	7

FFM301-Q1 THRU FFM307-Q1

3.0A Surface Mount Fast Recovery Rectifiers 50V-1000V

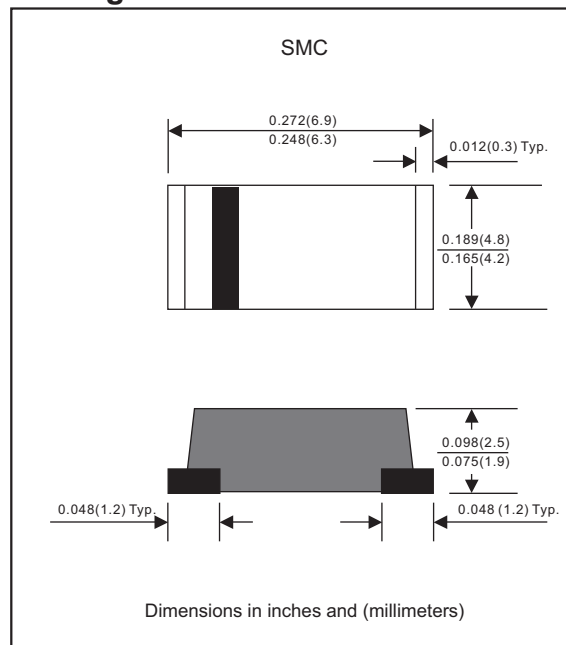
Features

- Batch process design, excellent power dissipation offers better reverse leakage current and thermal resistance
- Low profile surface mounted application in order to optimize board space
- High current capability
- Fast switching for high efficiency
- High surge current capability
- Glass passivated chip junction
- Lead-free parts meet RoHS requirements
- Qualified to AEC-Q101 standards for high reliability
- Suffix "-H" indicates Halogen-free parts, ex. FFM301-Q1-H

Mechanical data

- Epoxy: UL94-V0 rated flame retardant
- Case : Molded plastic, SMC
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity : Indicated by cathode band
- Mounting Position : Any
- Weight : Approximated 0.19 gram

Package outline

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

PARAMETER	SYMBOLS	FFM301-Q1	FFM302-Q1	FFM303-Q1	FFM304-Q1	FFM305-Q1	FFM306-Q1	FFM307-Q1	UNIT
Maximum repetitive peak reverse voltage	V_{RRM}	50	100	200	400	600	800	1000	Volts
Maximum RMS voltage	V_{RMS}	35	70	140	280	420	560	700	Volts
Maximum continuous reverse voltage	V_R	50	100	200	400	600	800	1000	Volts
Maximum average forward rectified current	I_o	3.0							Amps
Non-repetitive peak forward surge current 8.3ms single half sine-wave	I_{FSM}	100							Amps
Typical junction capacitance (Note 1)	C_J	60							pF
Operating junction temperature range	T_J	-55 to +150							$^{\circ}\text{C}$
Storage temperature range	T_{STG}	-65 to +175							$^{\circ}\text{C}$

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

PARAMETER	SYMBOLS	FFM301-Q1	FFM302-Q1	FFM303-Q1	FFM304-Q1	FFM305-Q1	FFM306-Q1	FFM307-Q1	UNIT
Maximum instantaneous forward voltage at $I_F=3.0\text{A}$	V_F	1.3							Volts
Maximum reverse leakage current $T_J=25^{\circ}\text{C}$ at rated V_R $T_J=125^{\circ}\text{C}$	I_R	5.0 300							μA μA
Maximum reverse recovery time (Note 2)	t_{rr}	150				250	500		ns

Thermal characteristics

PARAMETER	SYMBOLS	FFM301-Q1	FFM302-Q1	FFM303-Q1	FFM304-Q1	FFM305-Q1	FFM306-Q1	FFM307-Q1	UNIT
Typical thermal resistance junction to ambient (Note 3)	$R_{\theta JA}$	32							$^{\circ}\text{C/W}$
Typical thermal resistance junction to case (Note 3)	$R_{\theta JC}$	17							$^{\circ}\text{C/W}$

Notes 1: Measured at 1 MHz and applied reverse voltage of 4.0 VDC

2: Measured with $I_F = 0.5\text{A}$, $I_R = 1\text{A}$, $t_{rr} = 0.25\text{A}$

3: Mounted on FR-4 PCB Copper, minimum recommended pad layout

Rating and characteristic curves (FFM301-Q1 THRU FFM307-Q1)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

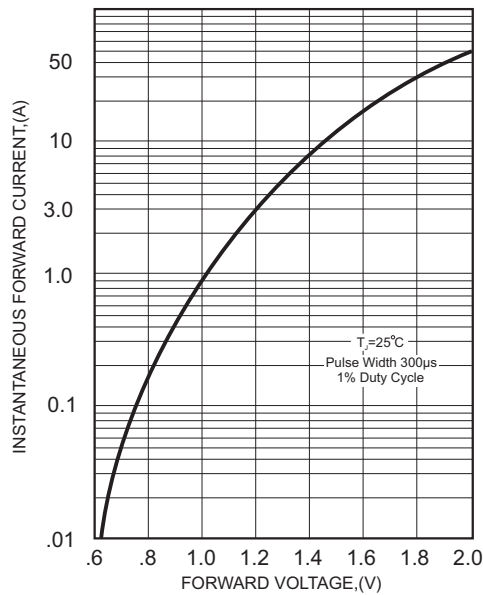


FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

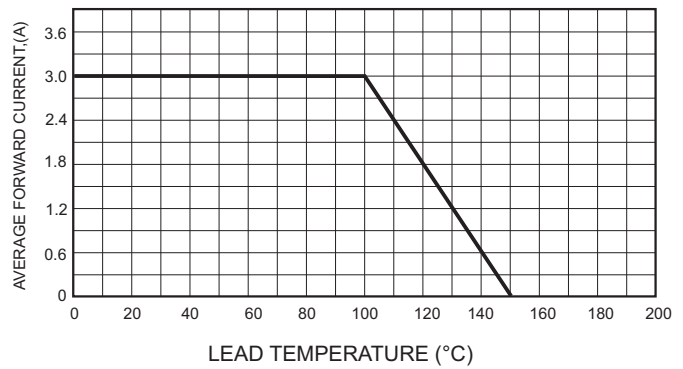


FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

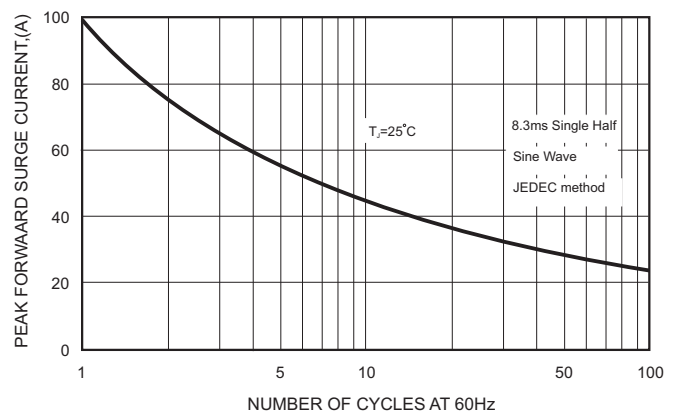


FIG.3- TEST CIRCUIT DIAGRAM AND REVERSE RECOVERY TIME CHARACTERISTICS

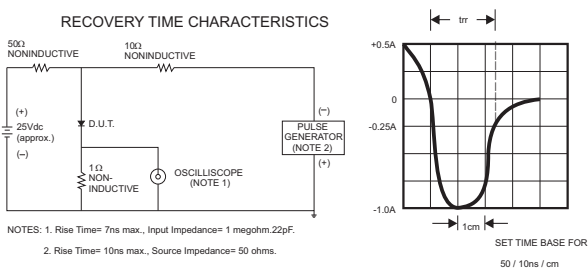


FIG.6 - TYPICAL REVERSE CHARACTERISTICS

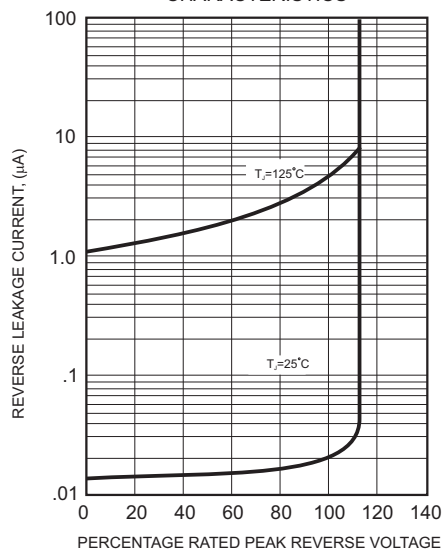
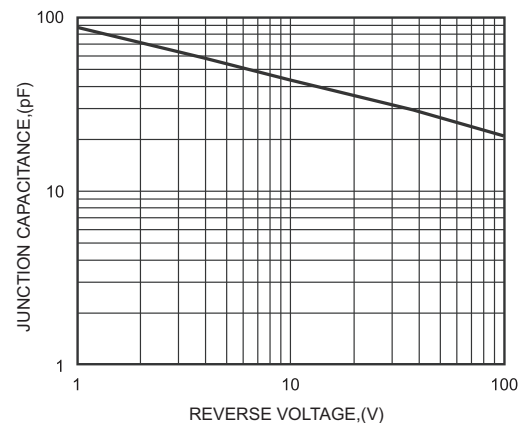


FIG.5-TYPICAL JUNCTION CAPACITANCE



FFM301-Q1 THRU FFM307-Q1

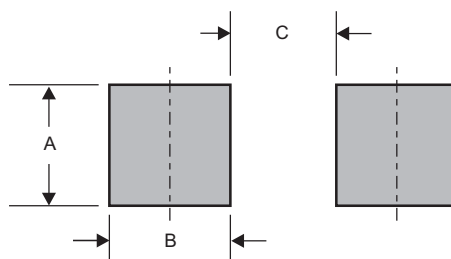
Pinning information

Pin	Simplified outline	Symbol
Pin1 cathode Pin2 anode		

Marking

Type number	Marking code
FFM301-Q1	F31
FFM302-Q1	F32
FFM303-Q1	F33
FFM304-Q1	F34
FFM305-Q1	F35
FFM306-Q1	F36
FFM307-Q1	F37

Suggested solder pad layout



Dimensions in inches and (millimeters)

PACKAGE	A	B	C
SMC	0.189 (4.80)	0.063 (1.60)	0.158 (4.00)

FFM301-Q1 THRU FFM307-Q1

Packing information



unit:mm

Item	Symbol	Tolerance	SMC
Carrier width	A	0.1	5.10
Carrier length	B	0.1	7.20
Carrier depth	C	0.1	2.50
Sprocket hole	d	0.1	1.50
13" Reel outside diameter	D	2.0	330.00
13" Reel inner diameter	D1	min	50.00
7" Reel outside diameter	D	2.0	178.00
7" Reel inner diameter	D1	min	62.00
Feed hole diameter	D2	0.5	13.00
Sprocket hole position	E	0.1	1.75
Punch hole position	F	0.1	5.50
Punch hole pitch	P	0.1	8.00
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	12.00
Reel width	W1	1.0	18.00

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

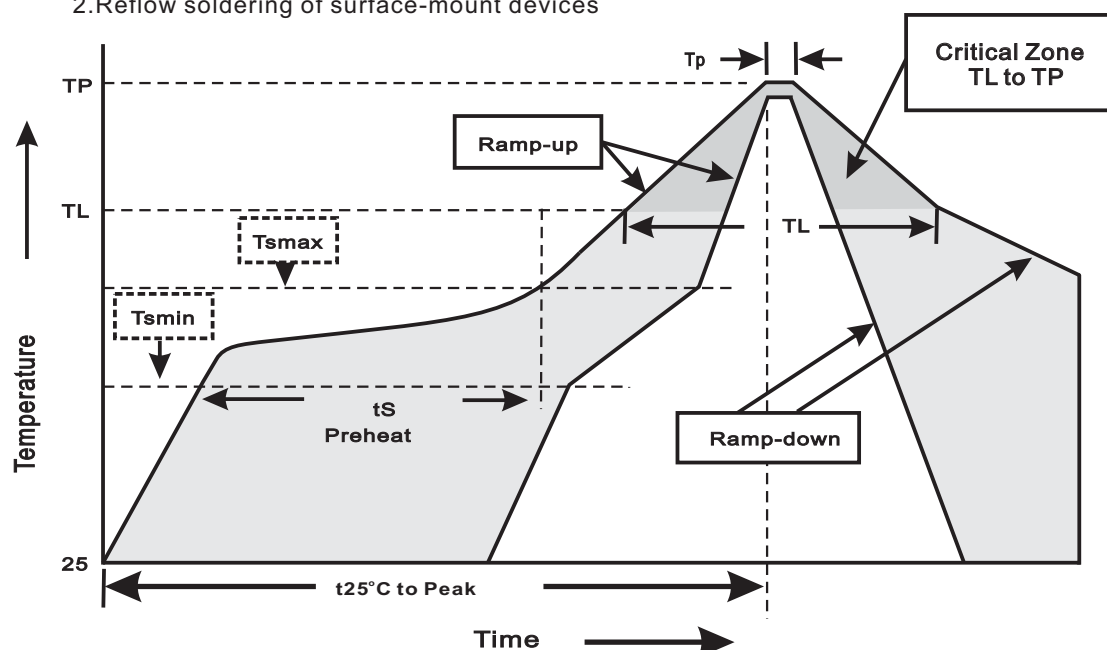
FFM301-Q1 THRU FFM307-Q1

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)
SMC	13"	3,000	8.0	6,000	335*335*38	330	350*330*360	48,000	17.0

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)	$<3^{\circ}\text{C/sec}$
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	$<3^{\circ}\text{C/sec}$
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	$<6^{\circ}\text{C/sec}$
Time 25°C to Peak Temperature	$<6\text{minutes}$

FFM301-Q1 THRU FFM307-Q1

High reliability test capabilities

Item Test	Conditions	Reference
1. MSL Preconditioning	24hr bake@125°C+168hrs@85°C /85%RH+3xIR@260°C+1flux immersion+alcohol+DI H2O rinse	JESD22-A113
2. Operation Life	Ta=25°C,Rated Current (Io=Io max.)Test Duration:1000hrs	MIL-STD-750E METHOD 1027.3
3. High Temperature Reverse Bias	80% Rated VR (Tj=Tj max.)Test Duration:1000hrs	JESD22-A108
4. High Temperature Storage Life	Ta=125°C Test Duration:1000hrs	JESD22 A-103
5. Temperature Cycle	-55°C(15min) to 150°C(15min)Test Cycles:1000cycles	JESD22 A-104
6. Autoclave	P=2atm Ta=121°C RH=100% Test Duration:96hrs	JESD22 A-102
7. Intermittent Operational Life	Ta=25°C,On/Io Max. 2min, Off/2min, Test Cycles:15000cycles	MIL-STD-750E METHOD 1037
8. Solderability	245±5°C for 5sec	J-STD-002
9. Moisture Resistance	Ta=85°C/85% Relative humidity Test Duration:1000hrs	MIL-STD-750E METHOD 1021.2
10. Resistance To Solder Heat	260±5°C for 10sec	JESD22 B-106
11. High Temperature High Humidity Reverse Bias	Ta=85°C, 85%RH, with device reverse biased at 80% of rated breakdown voltage up to a maximum of 100V or limit of chamber Test Duration:1000hrs	JESD22-A101