

FMUN5211DW-Q1 Thru FMUN5241DW-Q1

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FMUN5211DW-Q1 Thru FMUN5241DW-Q1

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

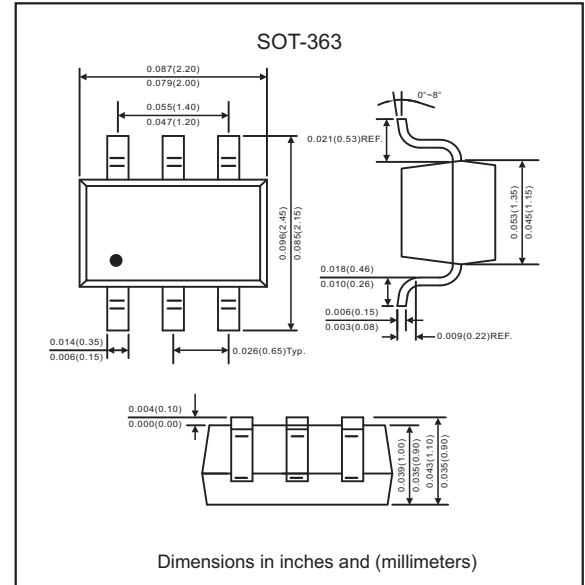
Features

- Simplifies circuit design.
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHs requirements.
- Qualified to AEC-Q101 standards for high reliability.
- Suffix "-H" indicates Halogen free parts, ex. FMUN5211DW-Q1-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant
- Case : Molded plastic, SOT-363
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026
- Mounting Position : Any

Package outline

Maximum ratings (At $T_A=25^{\circ}\text{C}$ unless otherwise noted, Common for Q_1 and Q_2)

Parameter	Symbol	Value	Unit
Collector base voltage	V_{CBO}	50	V
Collector to emitter voltage	V_{CEO}	50	V
Collector current	I_C	100	mA
Power dissipation (Note1)	P_D	187	mW
Junction temperature	T_j	150	$^{\circ}\text{C}$
Storage temperature range	T_{stg}	-55 to +150	$^{\circ}\text{C}$
Thermal resistance junction to ambient (Note 1)	$R_{\theta JA}$	493	$^{\circ}\text{C/W}$
Thermal resistance junction to lead (Note 1)	$R_{\theta JL}$	188	$^{\circ}\text{C/W}$

Note : 1. FR-4 @Minimum pad

Electrical characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted, common for Q_1 and Q_2)(Continued)

Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
DC Current gain	$V_{CE} = 10V, I_C = 5mA$	FMUN5211DW-Q1	h_{FE}	35			
		FMUN5212DW-Q1		60			
		FMUN5213DW-Q1		80			
		FMUN5214DW-Q1		80			
		FMUN5215DW-Q1		160			
		FMUN5216DW-Q1		160			
		FMUN5230DW-Q1		3			
		FMUN5231DW-Q1		8			
		FMUN5232DW-Q1		15			
		FMUN5233DW-Q1		80			
		FMUN5234DW-Q1		80			
		FMUN5235DW-Q1		80			
		FMUN5238DW-Q1		160			
		FMUN5241DW-Q1		160			

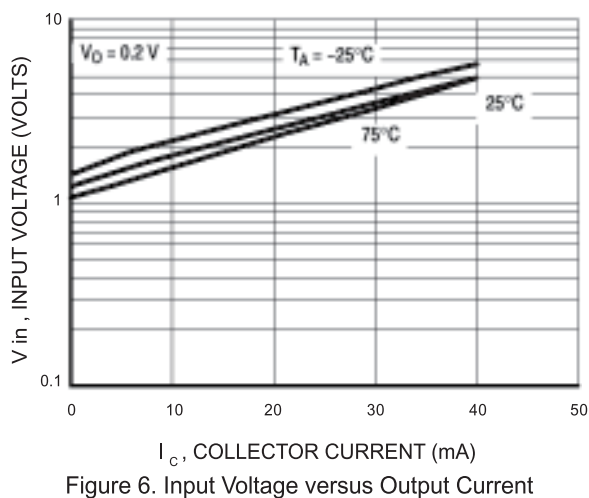
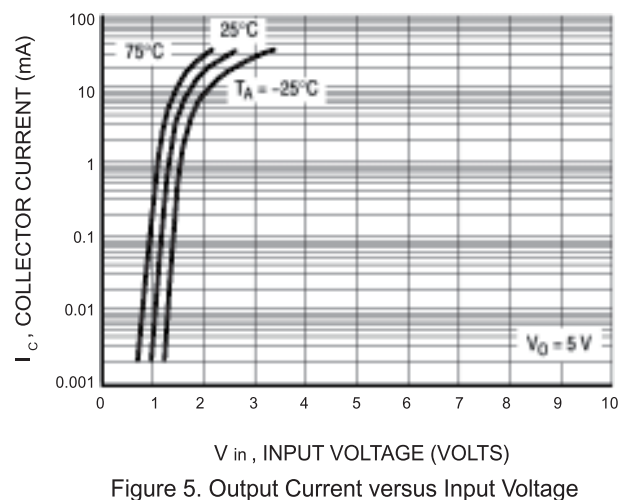
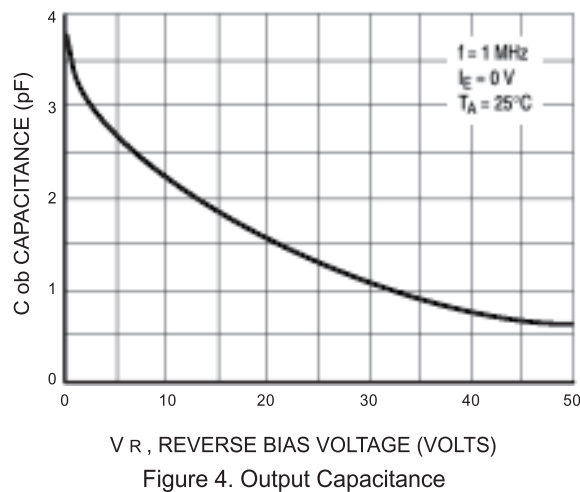
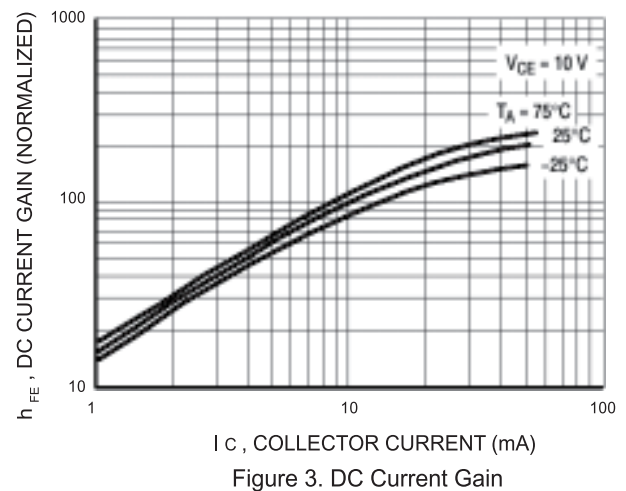
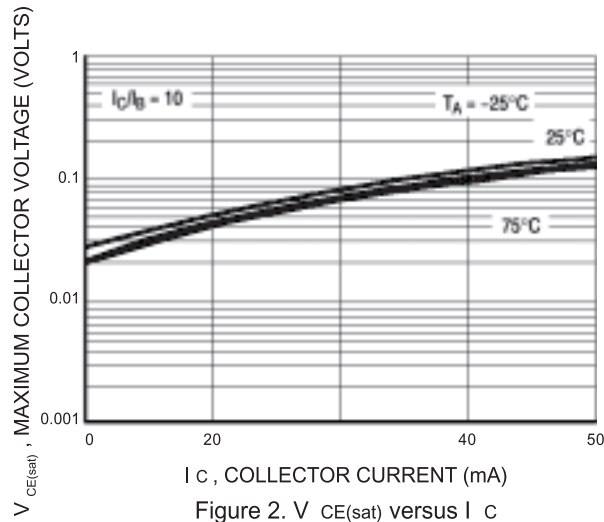
FMUN5211DW-Q1 Thru FMUN5241DW-Q1

Electrical characteristics (At $T_A=25^\circ\text{C}$ unless otherwise noted, Common for Q₁ and Q₂) (Continued)

Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
Collector base breakdown voltage	$I_C=10\mu\text{A}$		$V_{(BR)CBO}$	50			V
Collector emitter breakdown voltage	$I_C=2\text{mA}$		$V_{(BR)CEO}$	50			V
Collector base cut off current	$V_{CB}=50\text{V}$		I_{CBO}			100	nA
Collector emitter cut off current	$V_{CE}=50\text{V}$		I_{CEO}			500	nA
Emitter base cut off current	$V_{EB}=6\text{V}$	FMUN5211DW-Q1	I_{EBO}			0.5	mA
		FMUN5212DW-Q1				0.2	
		FMUN5213DW-Q1				0.1	
		FMUN5214DW-Q1				0.2	
		FMUN5215DW-Q1				0.9	
		FMUN5216DW-Q1				1.9	
		FMUN5230DW-Q1				4.3	
		FMUN5231DW-Q1				2.3	
		FMUN5232DW-Q1				1.5	
		FMUN5233DW-Q1				0.18	
		FMUN5234DW-Q1				0.13	
		FMUN5235DW-Q1				0.2	
		FMUN5238DW-Q1				4	
		FMUN5241DW-Q1				0.1	
Collector emitter saturation voltage	$I_C=10\text{mA}, I_B=0.3\text{mA}$	FMUN5211DW-Q1	$V_{CE(sat)}$				V
		FMUN5212DW-Q1					
		FMUN5213DW-Q1					
		FMUN5214DW-Q1					
		FMUN5241DW-Q1					
	$I_C=10\text{mA}, I_B=5\text{mA}$	FMUN5230DW-Q1				0.25	
		FMUN5231DW-Q1					
	$I_C=10\text{mA}, I_B=1\text{mA}$	FMUN5215DW-Q1					
		FMUN5216DW-Q1					
		FMUN5232DW-Q1					
		FMUN5233DW-Q1					
		FMUN5234DW-Q1					
		FMUN5235DW-Q1					
		FMUN5238DW-Q1					
Output voltage (on)	$V_{CC}=5\text{V}, V_B=2.5\text{V}, R_L=1\text{K}\Omega$		V_{OL}				V
	$V_{CC}=5\text{V}, V_B=3.5\text{V}, R_L=1\text{K}\Omega$	FMUN5213DW-Q1				0.2	
	$V_{CC}=5\text{V}, V_B=5\text{V}, R_L=1\text{K}\Omega$	FMUN5241DW-Q1					
Output voltage (off)	$V_{CC}=5\text{V}, V_B=0.5\text{V}, R_L=1\text{K}\Omega$		V_{OH}	4.9			V
	$V_{CC}=5\text{V}, V_B=0.05\text{V}, R_L=1\text{K}\Omega$	FMUN5230DW-Q1					
	$V_{CC}=5\text{V}, V_B=0.25\text{V}, R_L=1\text{K}\Omega$	FMUN5215DW-Q1					
		FMUN5216DW-Q1					
		FMUN5233DW-Q1					
		FMUN5238DW-Q1					

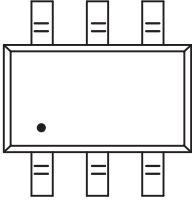
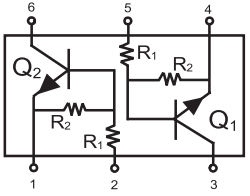
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Rating and characteristic curves



FMUN5211DW-Q1 Thru FMUN5241DW-Q1

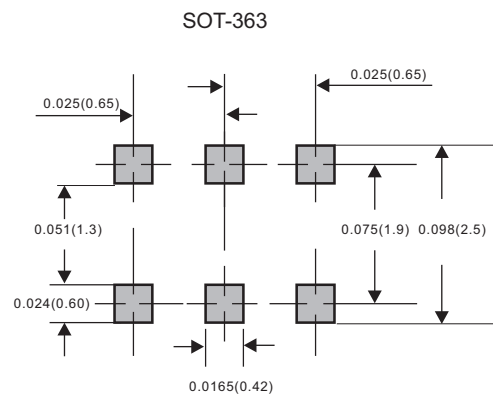
Pinning information

Pin	Simplified outline	Symbol
Pin2, 5 Base Pin1, 4 Emitter Pin3, 6 Collector		

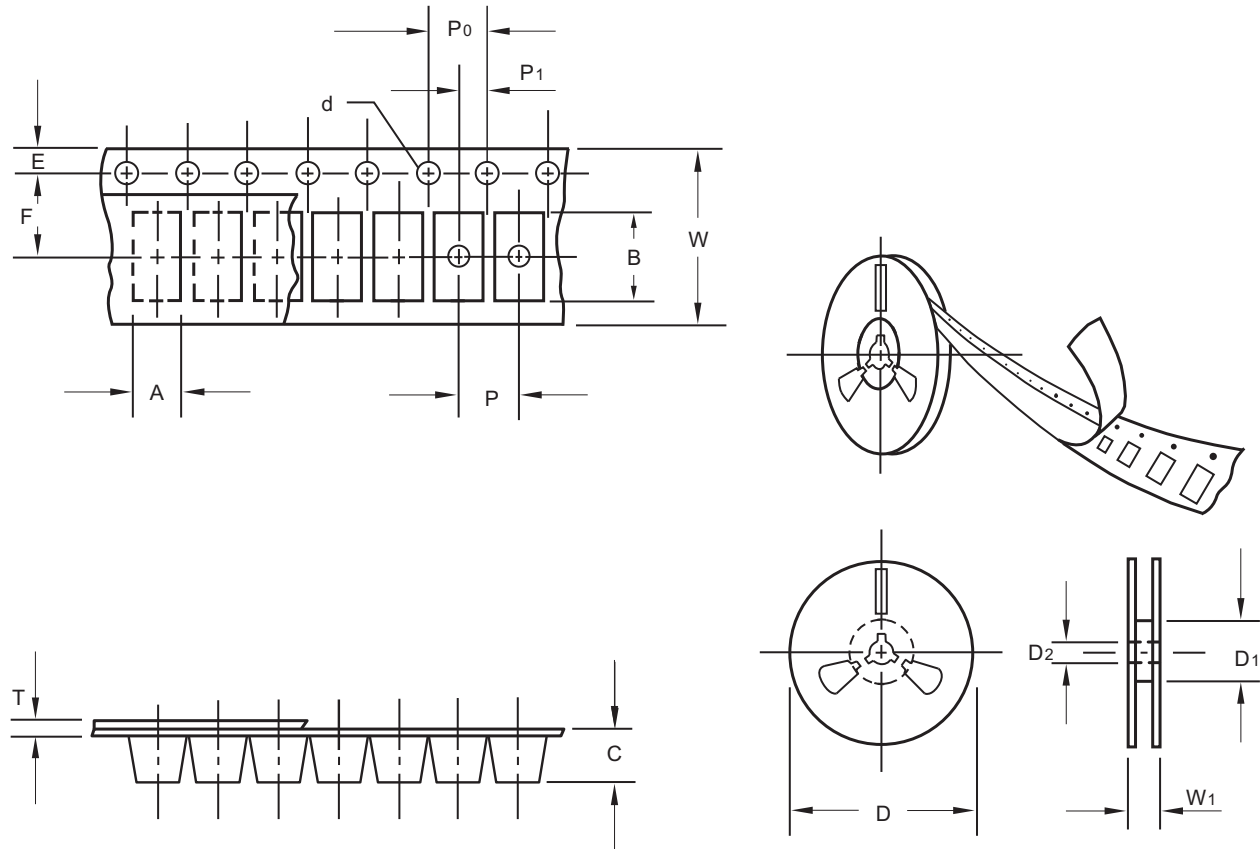
Device marking, Resistor values and ordering information

Device	Marking	Input resistor R_1 (K Ω)			R_2 (K Ω)	Resistor ratio R_1 / R_2	
		Min	Normal	Max		Min	Max
FMUN5211DW-Q1	7A	7	10	13	10	0.8	1.2
FMUN5212DW-Q1	7B	15.4	22	28.6	22	0.8	1.2
FMUN5213DW-Q1	7C	32.9	47	61.1	47	0.8	1.2
FMUN5214DW-Q1	7D	7	10	13	47	0.17	0.25
FMUN5215DW-Q1	7E	7	10	13	—	—	—
FMUN5216DW-Q1	7F	3.3	4.7	6.1	—	—	—
FMUN5230DW-Q1	7G	0.7	1	1.3	1	0.8	1.2
FMUN5231DW-Q1	7H	1.5	2.2	2.9	2.2	0.8	1.2
FMUN5232DW-Q1	7J	3.3	4.7	6.1	4.7	0.8	1.2
FMUN5233DW-Q1	7K	3.3	4.7	6.1	47	0.055	0.185
FMUN5234DW-Q1	7L	15.4	22	28.6	47	0.38	0.56
FMUN5235DW-Q1	7M	1.54	2.2	2.86	47	0.038	0.056
FMUN5238DW-Q1	7Q	1.54	2.2	2.86	—	—	—
FMUN5241DW-Q1	7T	70	100	130	—	—	—

Suggested solder pad layout



Dimensions in inches and (millimeters)

FMUN5211DW-Q1 Thru FMUN5241DW-Q1**Packing information**

unit:mm

Item	Symbol	Tolerance	SOT-363
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	D1	min	-
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	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
Overall tape thickness	T	0.1	0.23
Tape width	W	0.3	8.00
Reel width	W1	1.0	11.40

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

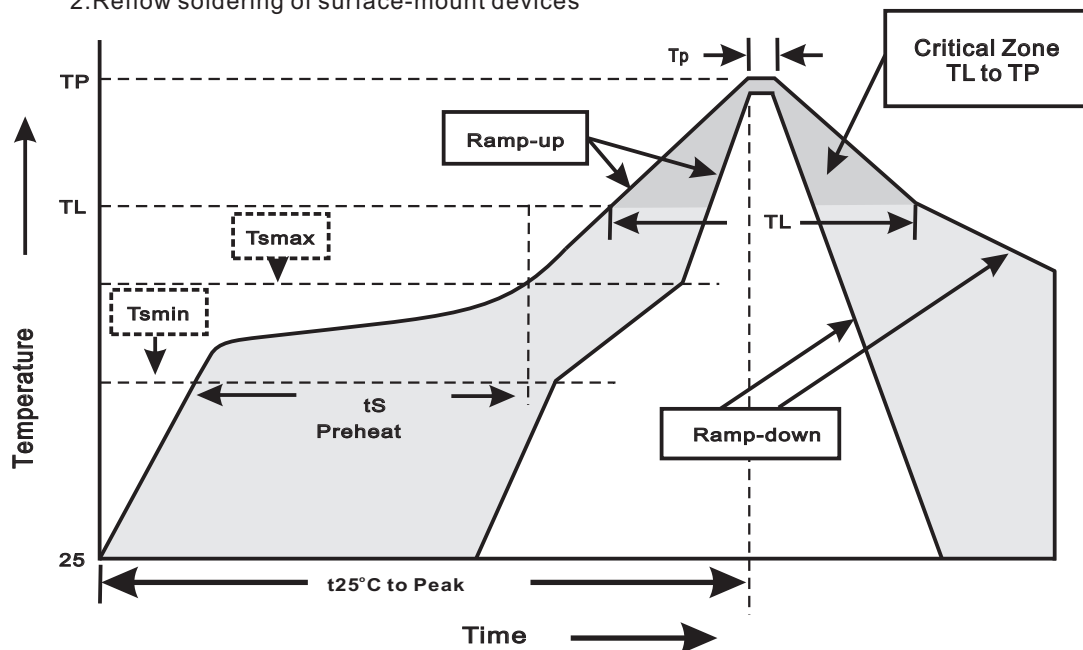
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Reel packing

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)	APPROX. GROSS WEIGHT (kg)
SOT-363	7"	3,000	4.0	30,000	183*183*123	178	382*262*387	240,000	9.50

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)	$255^\circ\text{C}-0/+5^\circ\text{C}$
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	$< 6\text{minutes}$