

FMUN5211DW Thru FMUN5241DW

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NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network

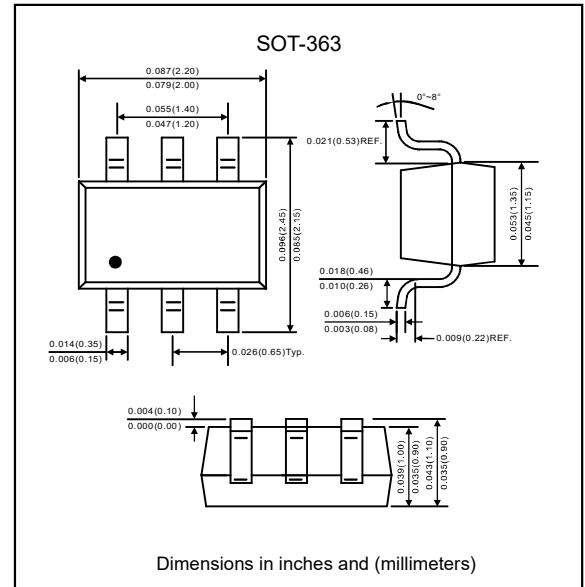
Features

- Simplifies circuit design.
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHs requirements.
- Suffix "-H" indicates Halogen free parts, ex. FMUN5211DW-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	Symbol	Device	Min.	Typ.	Max.	Unit
DC Current gain	$V_{CE} = 10\text{V}$, $I_C = 5\text{mA}$	h_{FE}	FMUN5211DW	35			
			FMUN5212DW	60			
			FMUN5213DW	80			
			FMUN5214DW	80			
			FMUN5215DW	160			
			FMUN5216DW	160			
			FMUN5230DW	3			
			FMUN5231DW	8			
			FMUN5232DW	15			
			FMUN5233DW	80			
			FMUN5234DW	80			
			FMUN5235DW	80			
			FMUN5238DW	160			
			FMUN5241DW	160			

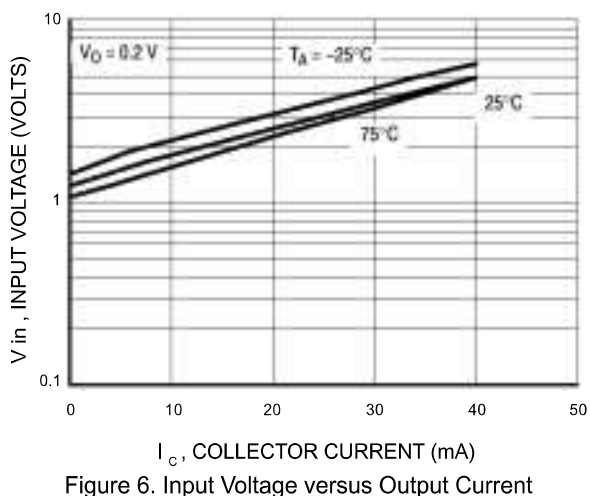
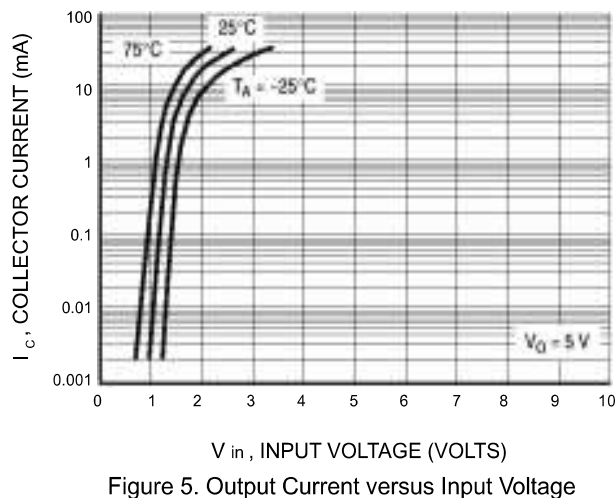
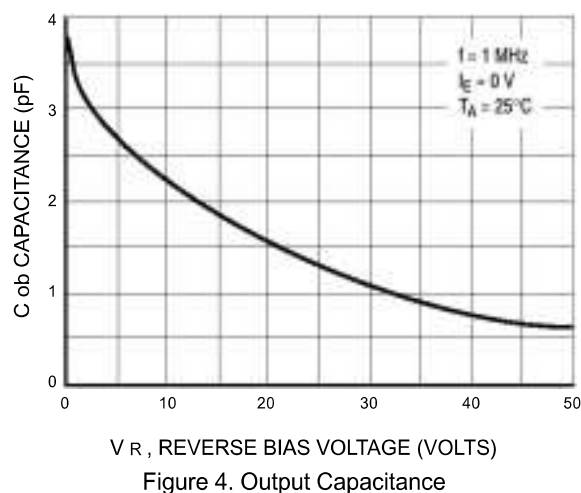
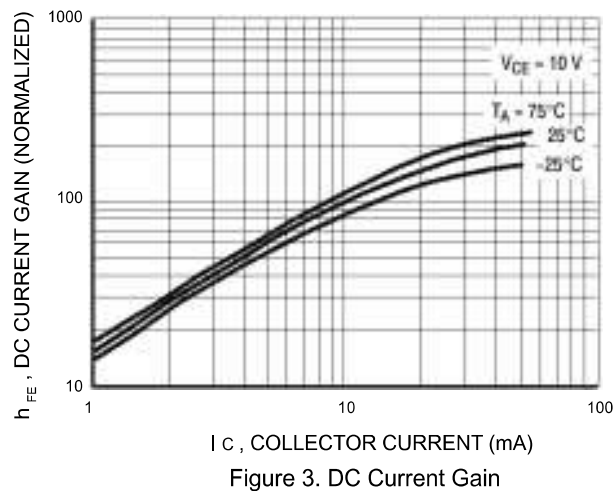
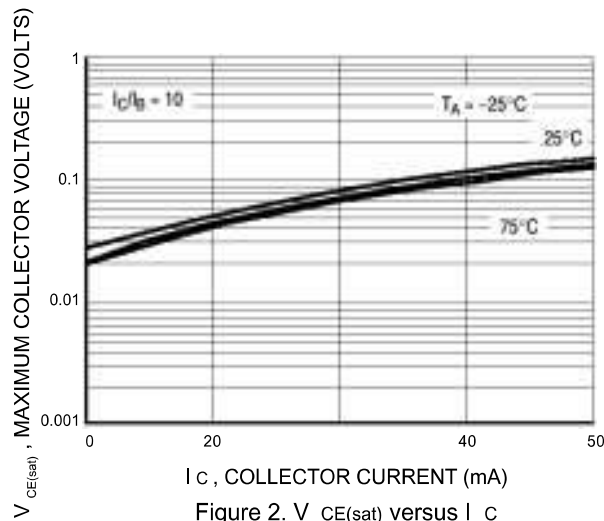
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Electrical characteristics (At $T_A=25^\circ\text{C}$ unless otherwise noted, Common for Q₁ and Q₂) (Continued)

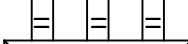
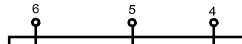
Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
Collector base breakdown voltage	$I_C=10\mu\text{A}$		$V_{(BR)CBO}$	50			V
Collector emitter breakdown voltage	$I_C=2\text{mA}$		$V_{(BR)CEO}$	50			V
Collector base cut off current	$V_{CB}=50\text{V}$		I_{CBO}			100	nA
Collector emitter cut off current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

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Rating and characteristic curves



Pinning information

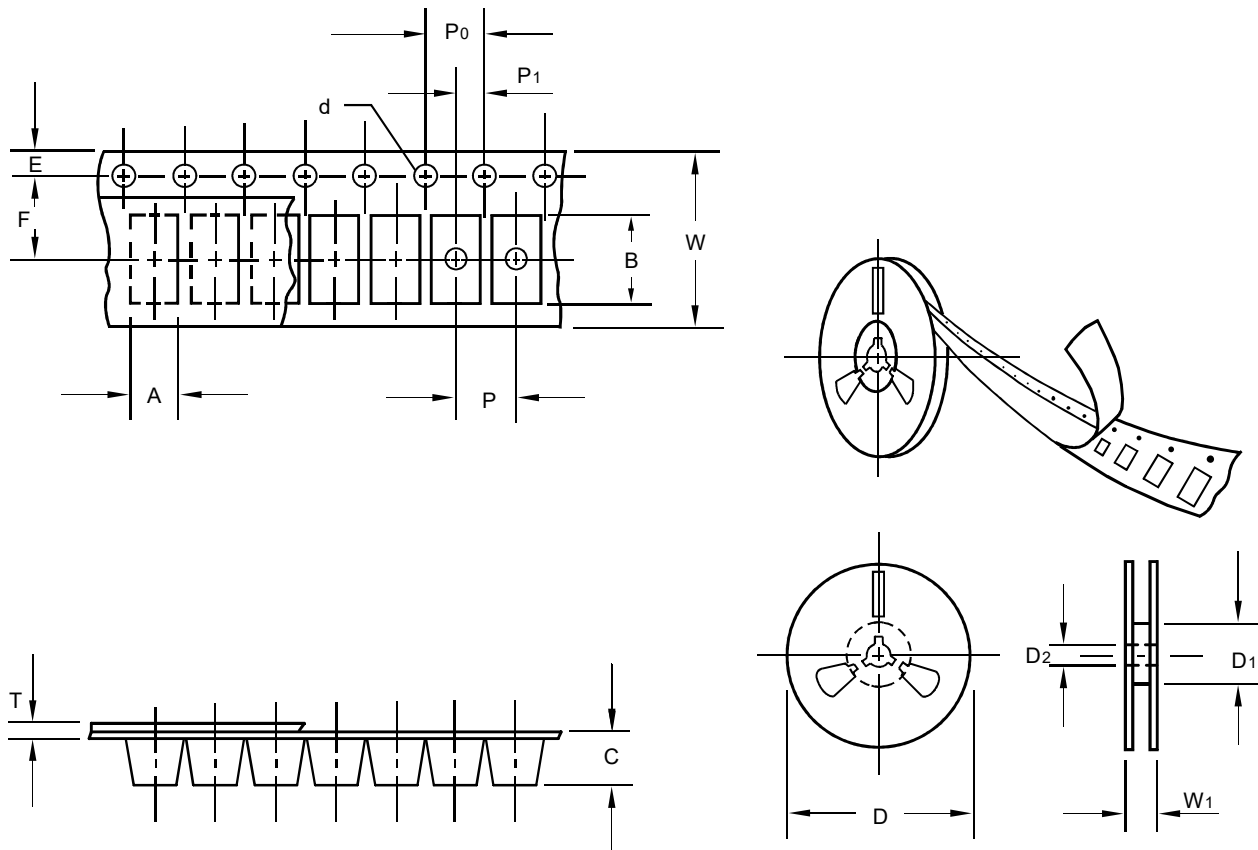
Pin	Simplified outline	Symbol
Pin2, 5 Base		

Device	Marking	Input resistor R ₁ (KΩ)			R ₂ (KΩ)	Resistor ratio R ₁ / R ₂	
		Min	Normal	Max		Min	Max
FMUN5211DW	7A	7	10	13	10	0.8	1.2
FMUN5212DW	7B	15.4	22	28.6	22	0.8	1.2
FMUN5213DW	7C	32.9	47	61.1	47	0.8	1.2
FMUN5214DW	7D	7	10	13	47	0.17	0.25
FMUN5215DW	7E	7	10	13	—	—	—
FMUN5216DW	7F	3.3	4.7	6.1	—	—	—
FMUN5230DW	7G	0.7	1	1.3	1	0.8	1.2
FMUN5231DW	7H	1.5	2.2	2.9	2.2	0.8	1.2
FMUN5232DW	7J	3.3	4.7	6.1	4.7	0.8	1.2
FMUN5233DW	7K	3.3	4.7	6.1	47	0.055	0.185
FMUN5234DW	7L	15.4	22	28.6	47	0.38	0.56
FMUN5235DW	7M	1.54	2.2	2.86	47	0.038	0.056
FMUN5238DW	7Q	1.54	2.2	2.86	—	—	—
FMUN5241DW	7T	70	100	130	—	—	—



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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.

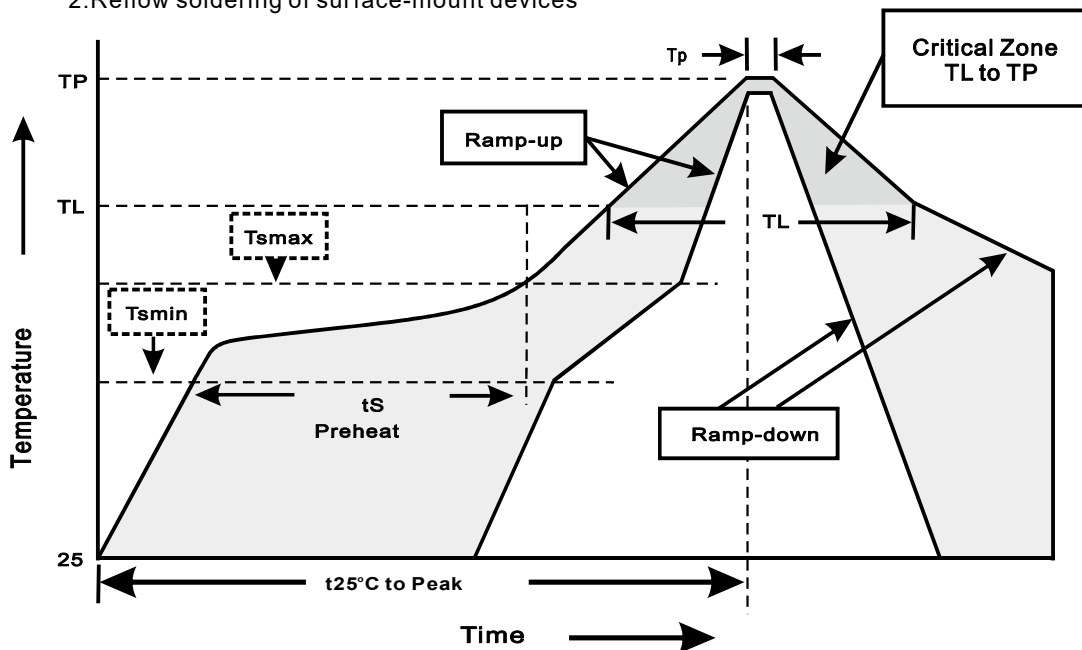
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Reel packing

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°C/sec
Preheat -Temperature Min(T _{smmin}) -Temperature Max(T _{smmax}) -Time(min to max)(t _s)	150°C 200°C 60~120sec
T _{smmax} 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