FMUN2111 Thru FMUN2134

List

FMUN2111 Thru FMUN2134

PNP Silicon Epitaxial Planar Digital Transistor

Features

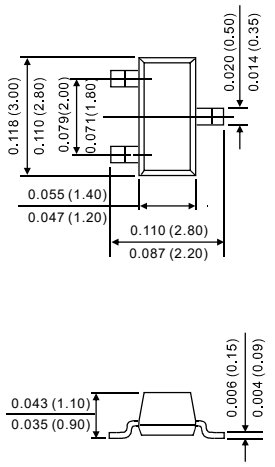
- Simplifies circuit design.
- Reduces board space.
- Reduces component count.
- The SOT-23 package can be soldered using wave or reflow, the modified gull-winged leads absorb thermal stress during soldering eliminating the possibility of damage to the die.
- For switching and interface circuit and drive circuit applications.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex.FMUN2111-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.
- Weight : Approximated 0.008 gram.

Package outline

SOT-23



Dimensions in inches and (millimeters)

Maximum ratings (At T_A=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Collector current	I_C	-100	mA
Total power dissipation	P_{tot}	200	mW
Operating junction temperature range	T_J	150	ºC
Storage temperature range	T_{STG}	-55 to +150	ºC

Electrical characteristics (At T_A=25°C unless otherwise noted)

Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
DC Current Gain	$-V_{CE}$=10V, $-I_C$=5mA	FMUN2111	h_{FE}	35			-
		FMUN2112		60			
		FMUN2113		80			
		FMUN2114		80			
		FMUN2115		160			
		FMUN2116		160			
		FMUN2130		3			
		FMUN2131		8			
		FMUN2132		15			
		FMUN2133		80			
		FMUN2134		80			

FMUN2111 Thru FMUN2134

Electrical characteristics (At T_A=25°C unless otherwise noted)

Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
Collector-Base cutoff current	$-V_{CB}$=50V		$-I_{CBO}$			100	nA
Collector-Emitter cutoff current	$-V_{CE}$=50V		$-I_{CEO}$			500	nA
Emitter base cutoff current	$-V_{EB}$=6V	FMUN2111	$-I_{EBO}$			0.5	mA
		FMUN2112				0.2	
		FMUN2113				0.1	
		FMUN2114				0.2	
		FMUN2115				0.9	
		FMUN2116				1.9	
		FMUN2130				4.3	
		FMUN2131				2.3	
		FMUN2132				1.5	
		FMUN2133				0.18	
		FMUN2134				0.13	
Collector Base Breakdown Voltage	$-I_C$=10μA		$-V_{(BR)CBO}$	50			V
Collector Emitter Breakdown Voltage	$-I_C$=2mA		$-V_{(BR)CEO}$	50			V
Collector Emitter Saturation Voltage	$-I_C$=10mA,$-I_B$=0.3mA		$-V_{(CE)sat}$			0.25	V
	$-I_C$=10mA,$-I_B$=5mA	FMUN2130					
		FMUN2131					
	$-I_C$=10mA,$-I_B$=1mA	FMUN2115					
		FMUN2116					
		FMUN2132					
		FMUN2133					
		FMUN2134					
Output voltage(on)	$-V_{CC}$=5V,$-V_B$=2.5V,R_L=1KΩ	FMUN2111	$-V_{OL}$			0.2	V
		FMUN2112					
		FMUN2114					
		FMUN2115					
		FMUN2116					
		FMUN2130					
		FMUN2131					
		FMUN2132					
		FMUN2133					
		FMUN2134					
	$-V_{CC}$=5V,$-V_B$=3.5V,R_L=1KΩ	FMUN2113					

FMUN2111 Thru FMUN2134

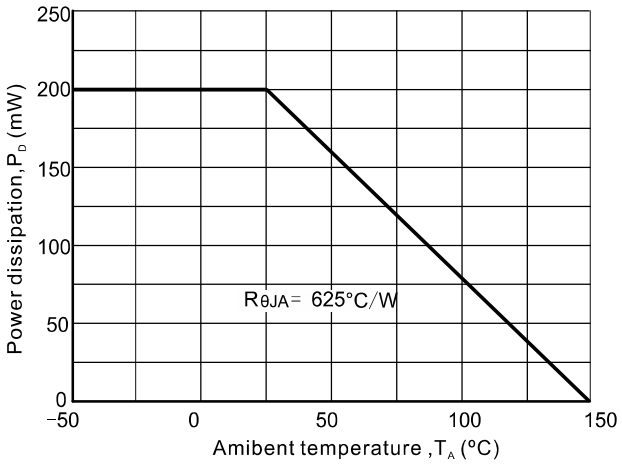
Electrical characteristics (At T_A=25°C unless otherwise noted)

Parameter	Conditions	Device	Symbol	Min.	Typ.	Max.	Unit
Output voltage(off)	$-V_{CC}$=5V,$-V_B$=0.5V,R_L=1KΩ	FMUN2130	$-V_{OH}$	4.9			V
	$-V_{CC}$=5V,$-V_B$=0.05V,R_L=1KΩ	FMUN2115					
	$-V_{CC}$=5V,$-V_B$=0.25V,R_L=1KΩ	FMUN2116					
		FMUN2131					
		FMUN2132					
Iutput resistor		FMUN2111	R_1	7		13	KΩ
		FMUN2112		15.4		28.6	
		FMUN2113		32.9		61.1	
		FMUN2114		7		13	
		FMUN2115		7		13	
		FMUN2116		3.3		6.1	
		FMUN2130		0.7		1.3	
		FMUN2131		1.5		2.9	
		FMUN2132		3.3		6.1	
		FMUN2133		3.3		6.1	
		FMUN2134		15.4		28.6	
Resistor ratio		FMUN2111	R_1/R_2	0.8		1.2	-
		FMUN2112					
		FMUN2113					
		FMUN2114		0.17		0.25	
		FMUN2115		-	-	-	
		FMUN2116					
		FMUN2130		0.8		1.2	
		FMUN2131					
		FMUN2132					
		FMUN2133		0.055		0.185	

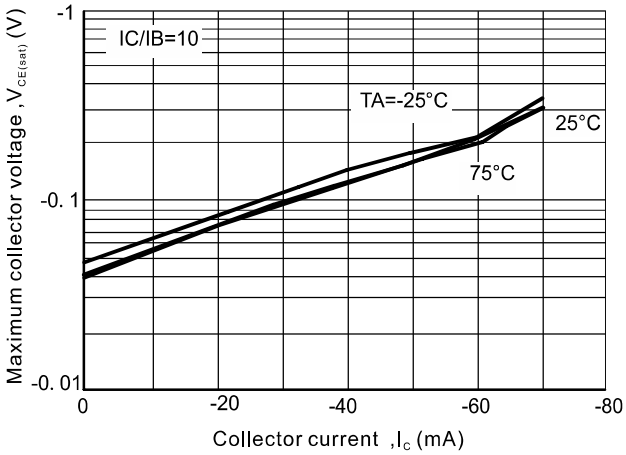
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2111)

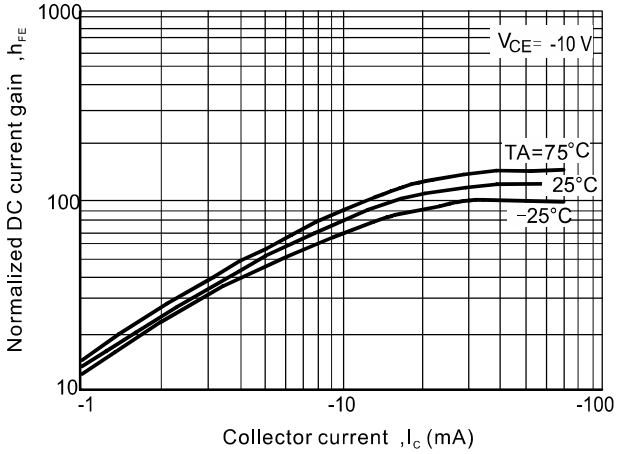
Derating curve



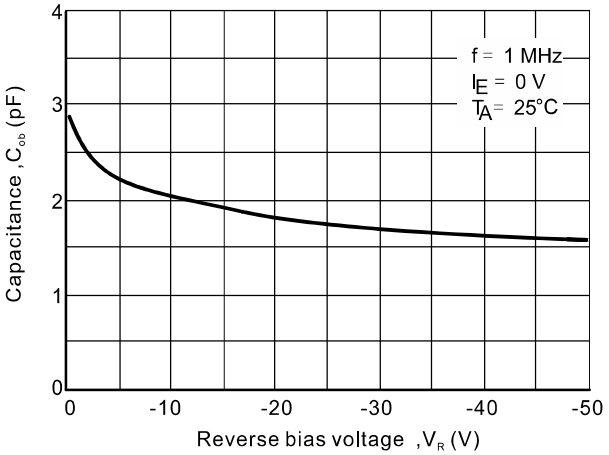
Maximum Collector voltage vs. Collector current



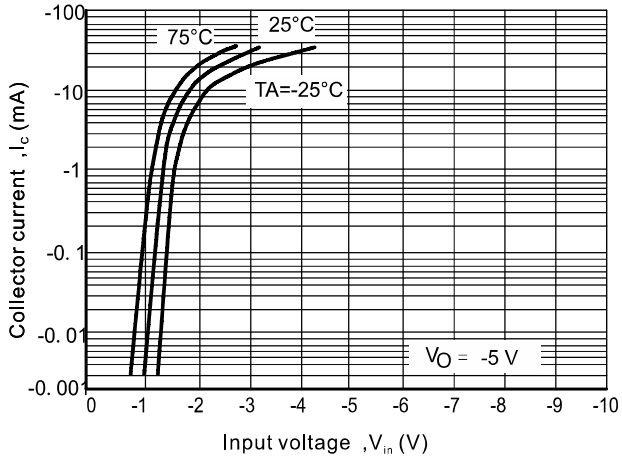
DC current gain



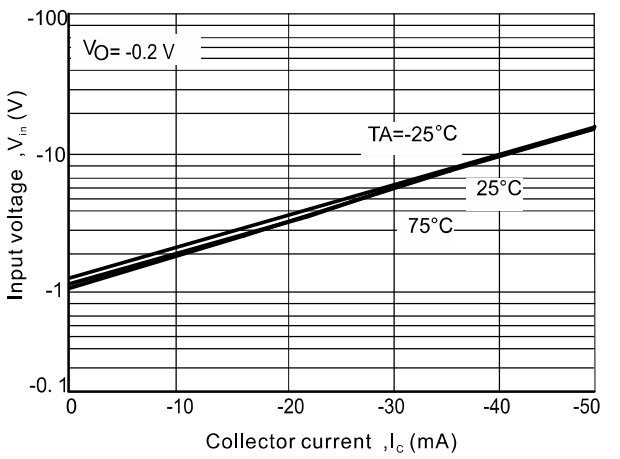
Output capacitance



Output current vs. Input voltage

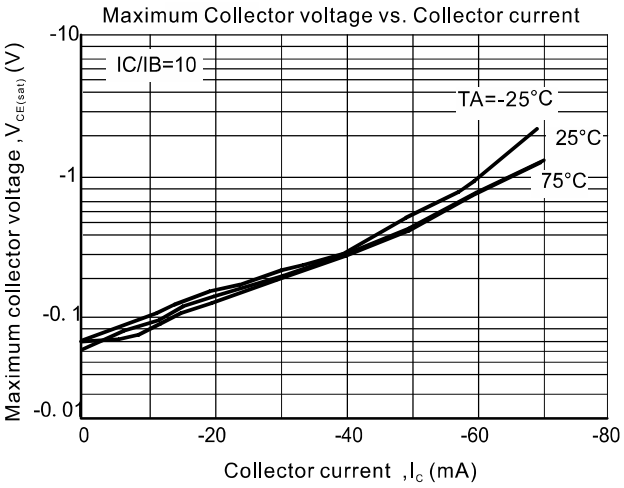


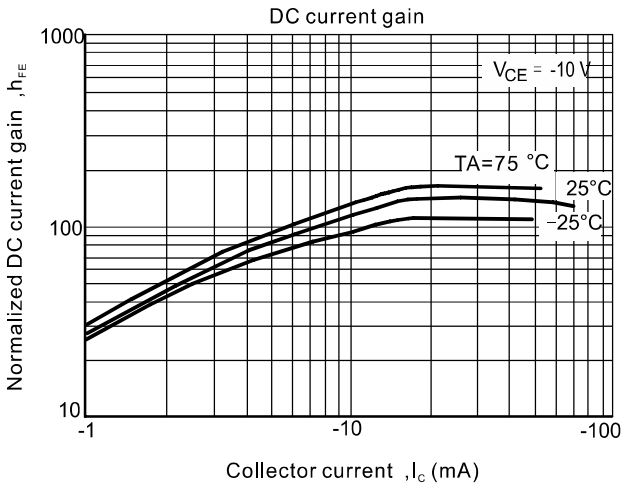
Input current vs. Output voltage

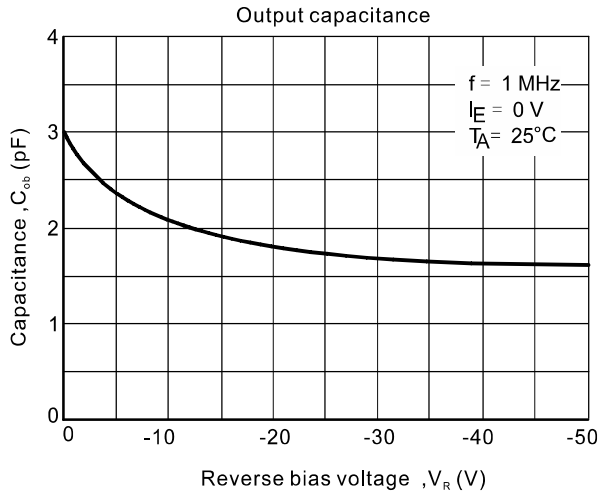


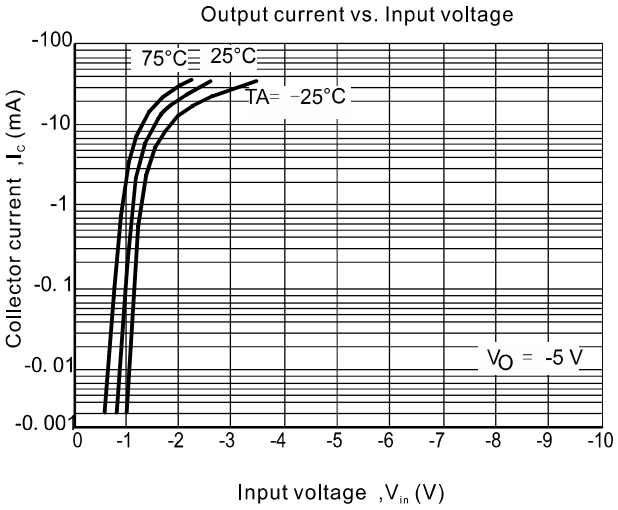
FMUN2111 Thru FMUN2134

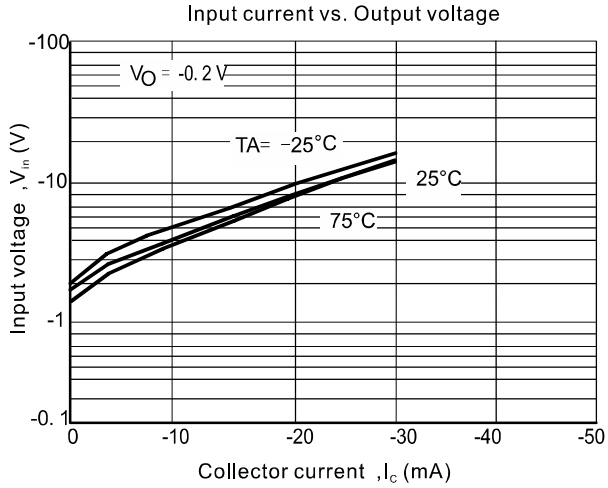
Rating and characteristic curves (FMUN2112)







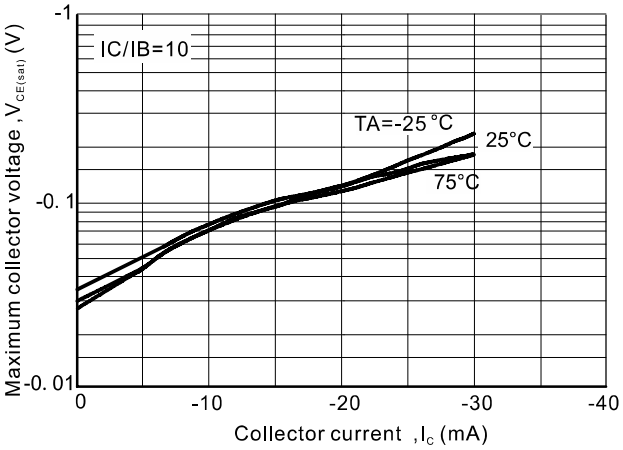




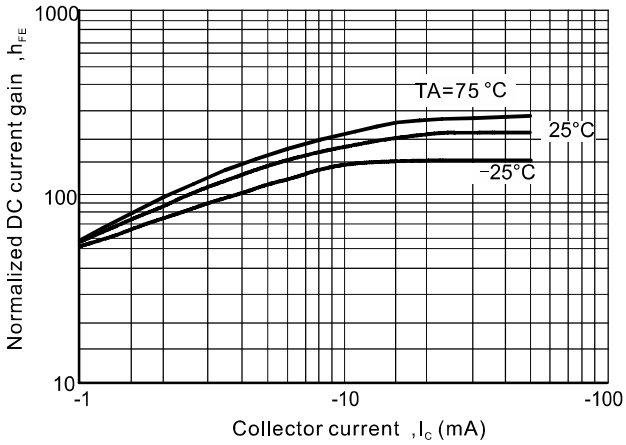
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2113)

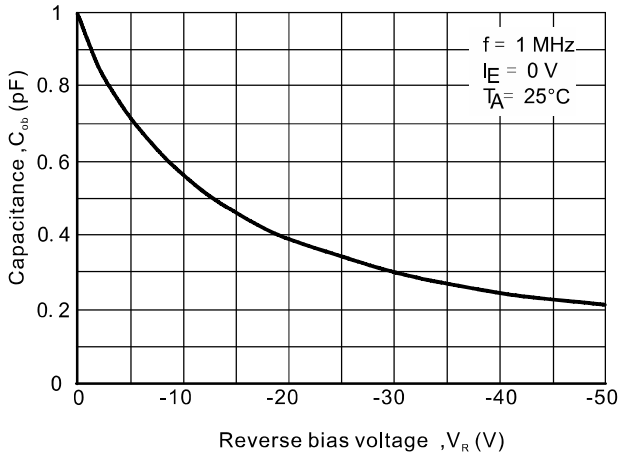
Maximum Collector voltage vs. Collector current



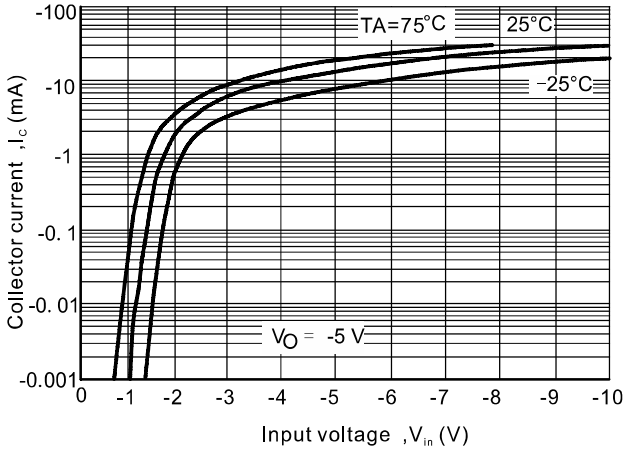
DC current gain



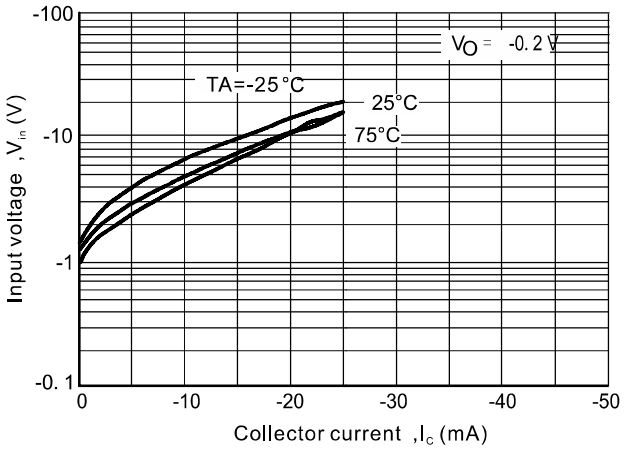
Output capacitance



Output current vs. Input voltage



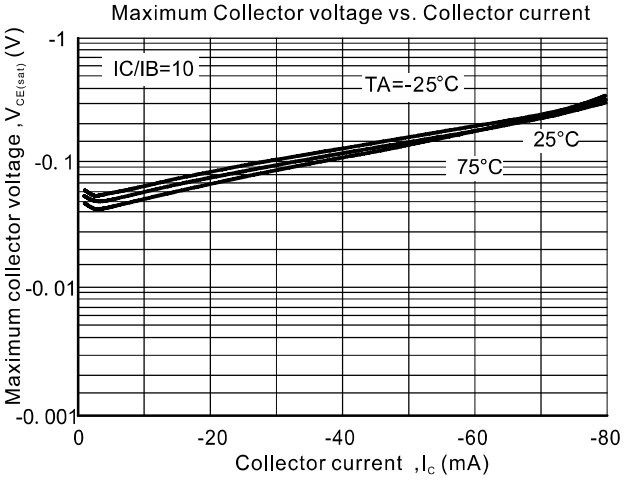
Input current vs. Output voltage



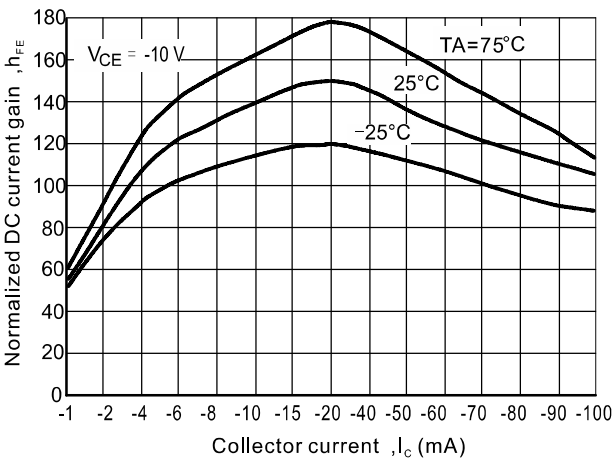
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2114)

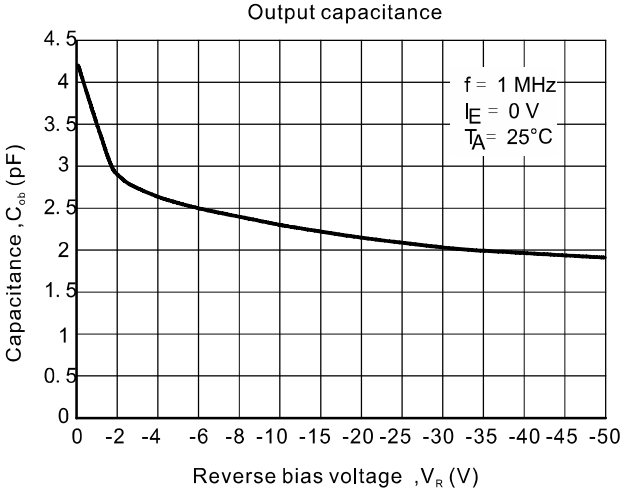
Maximum Collector voltage vs. Collector current



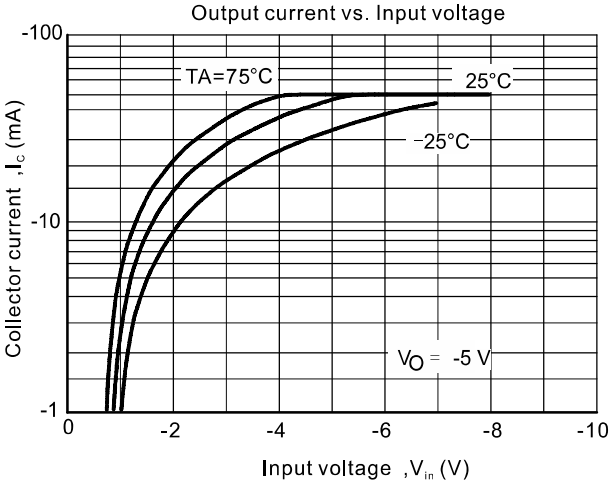
DC current gain



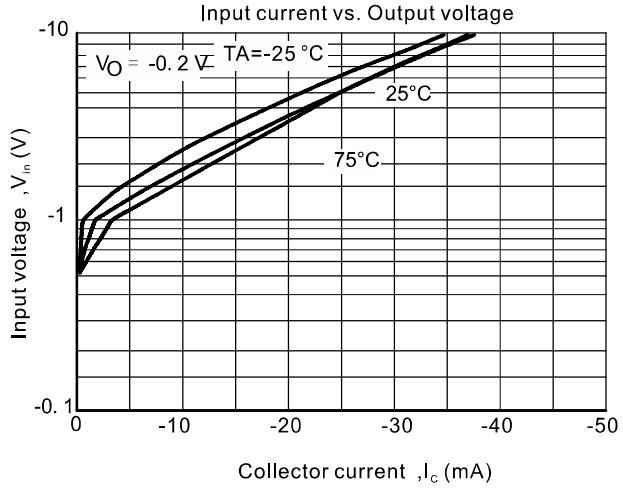
Output capacitance



Output current vs. Input voltage

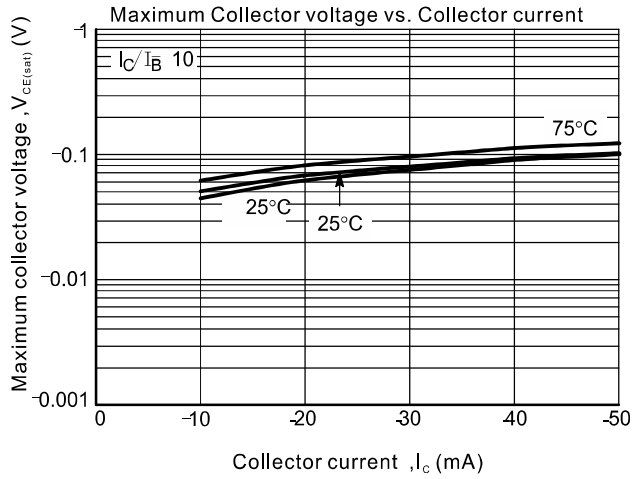


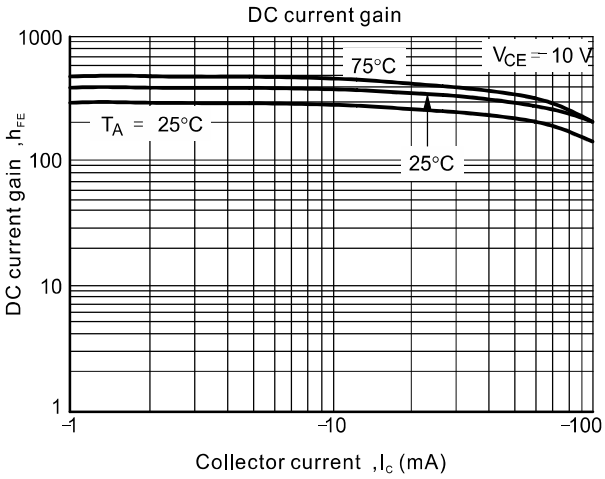
Input current vs. Output voltage

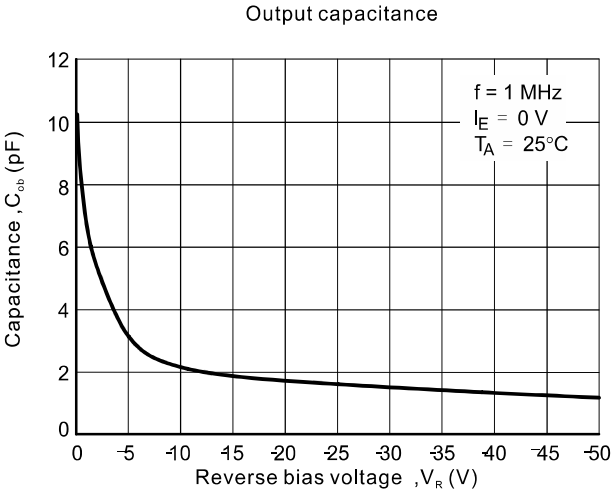


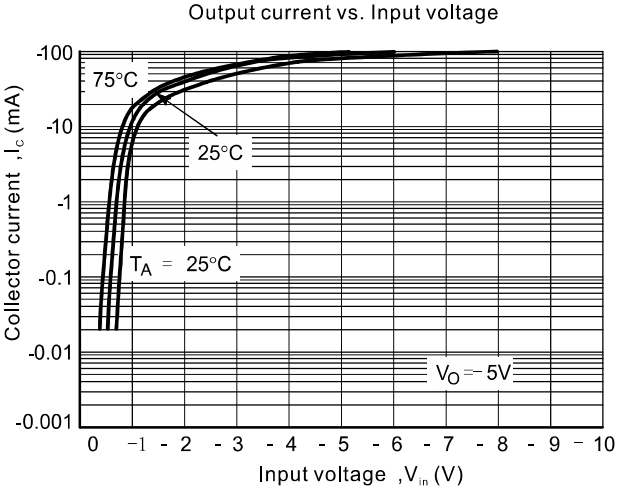
FMUN2111 Thru FMUN2134

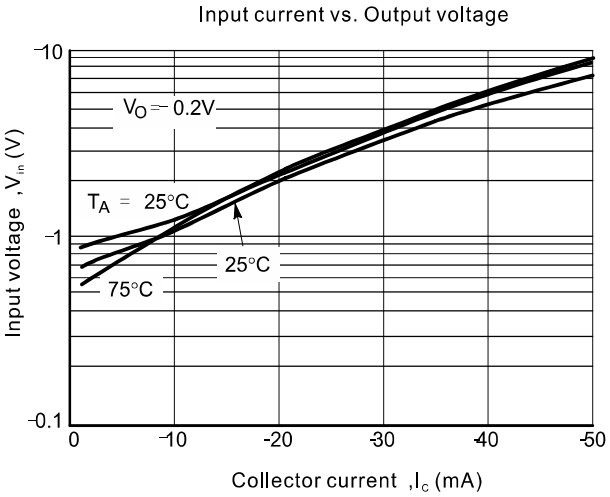
Rating and characteristic curves (FMUN2115)







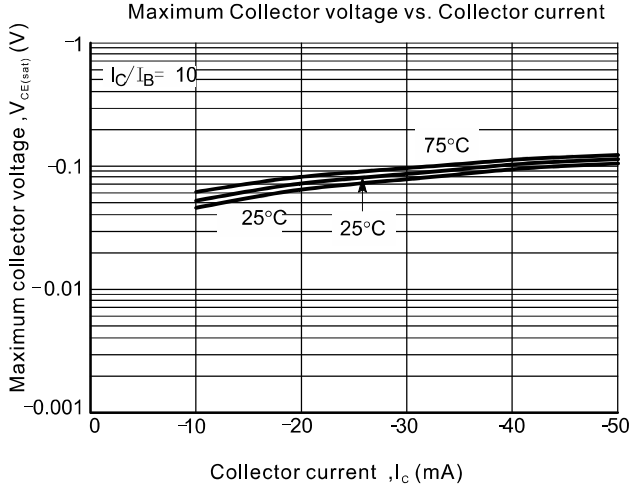




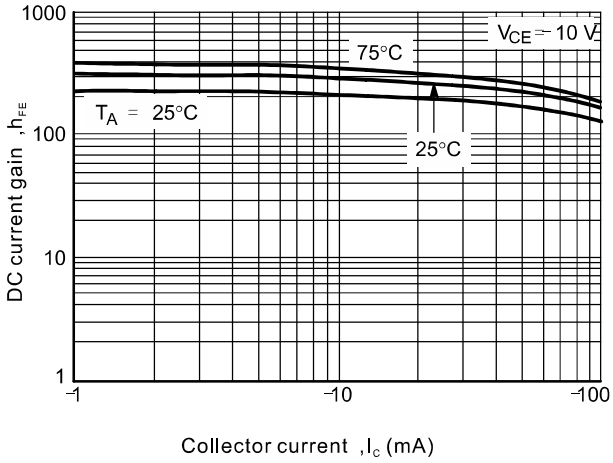
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2116)

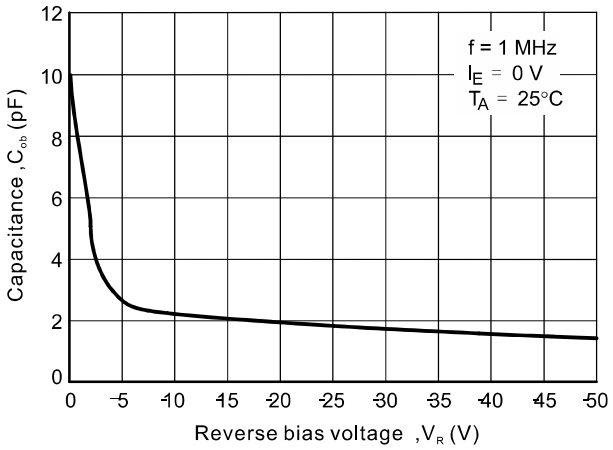
Maximum Collector voltage vs. Collector current



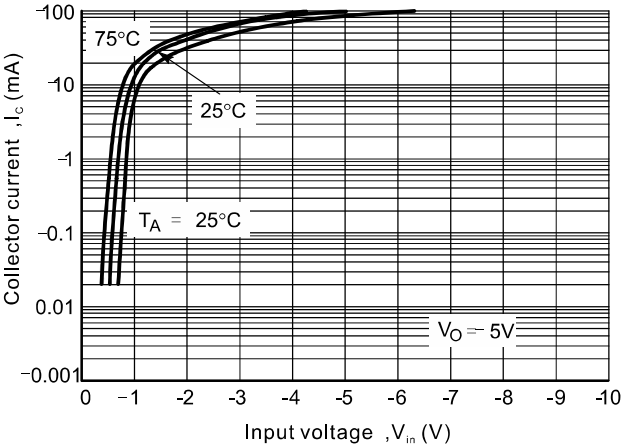
DC current gain



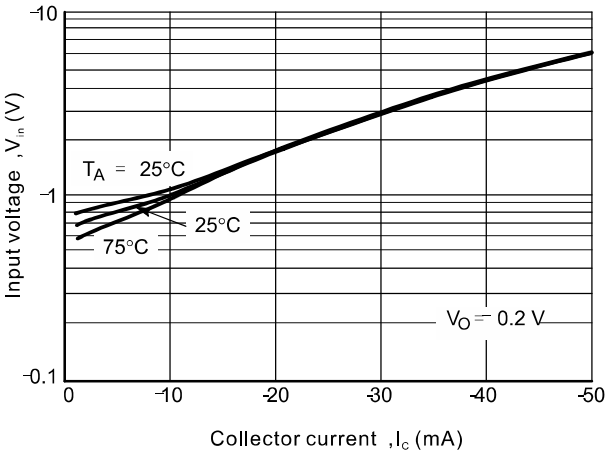
Output capacitance



Output current vs. Input voltage



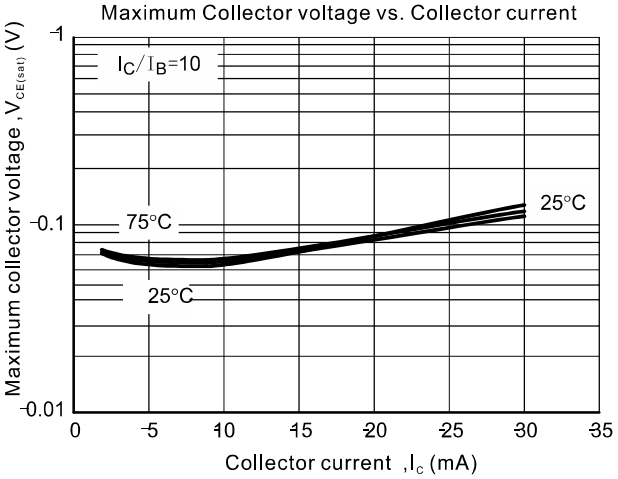
Input current vs. Output voltage



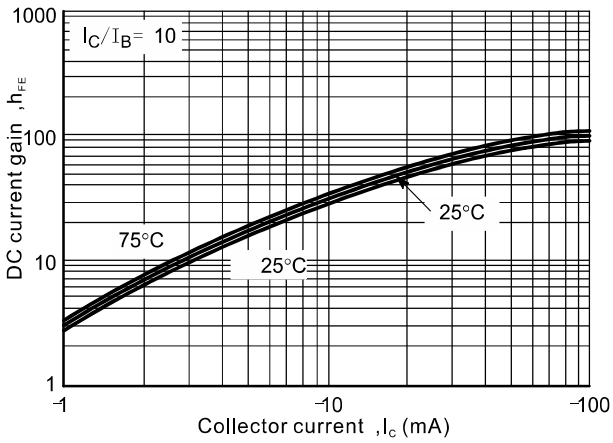
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2131)

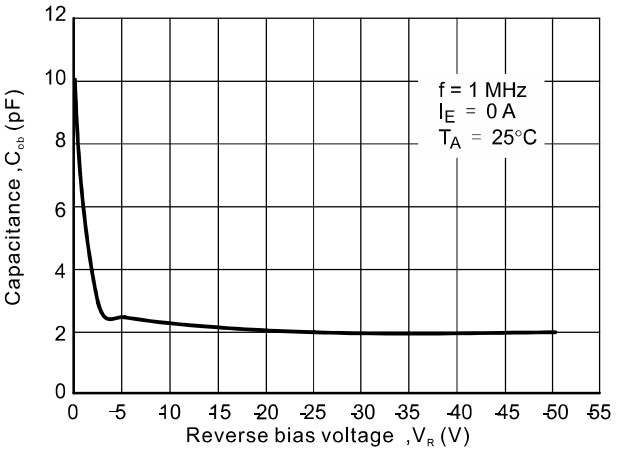
Maximum Collector voltage vs. Collector current



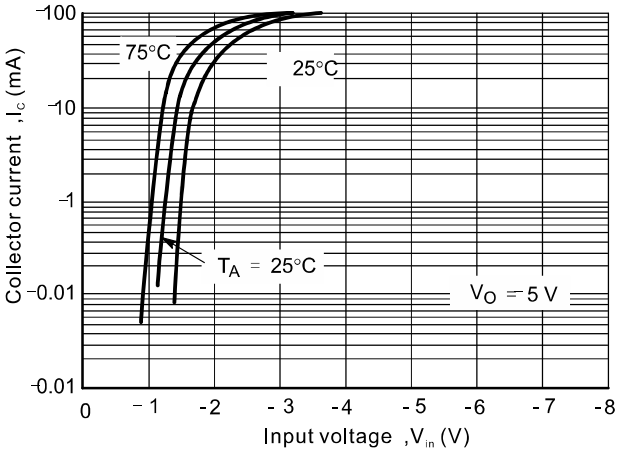
DC current gain



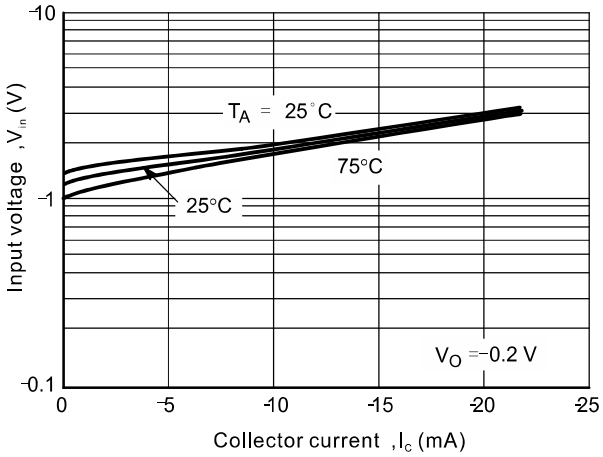
Output capacitance



Output current vs. Input voltage



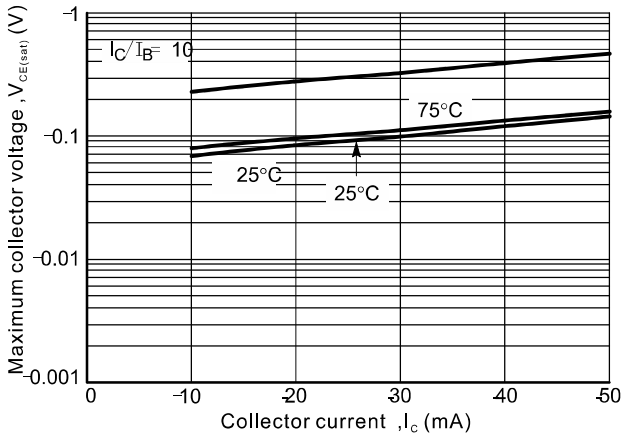
Input current vs. Output voltage



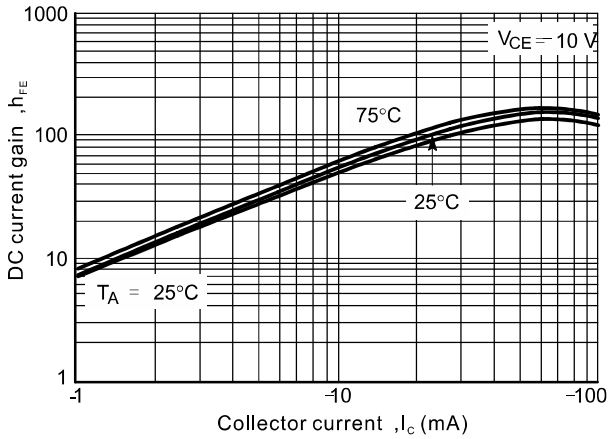
FMUN2111 Thru FMUN2134

Rating and characteristic curves (FMUN2132)

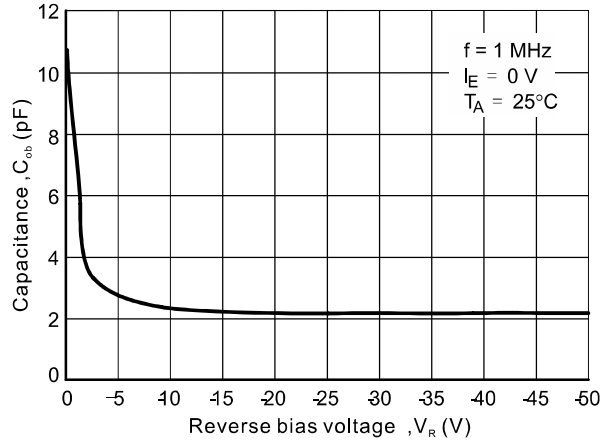
Maximum Collector voltage vs. Collector current



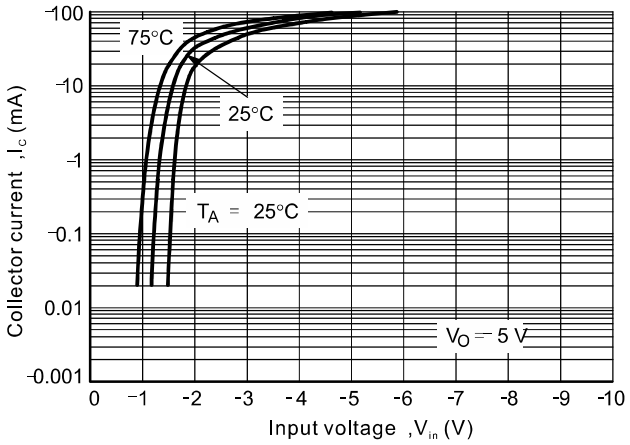
DC current gain



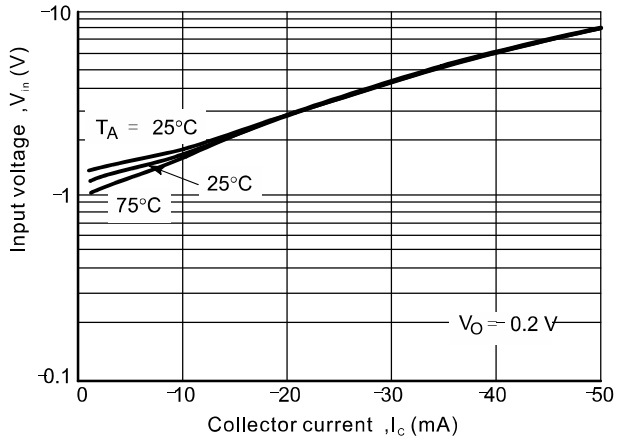
Output capacitance



Output current vs. Input voltage

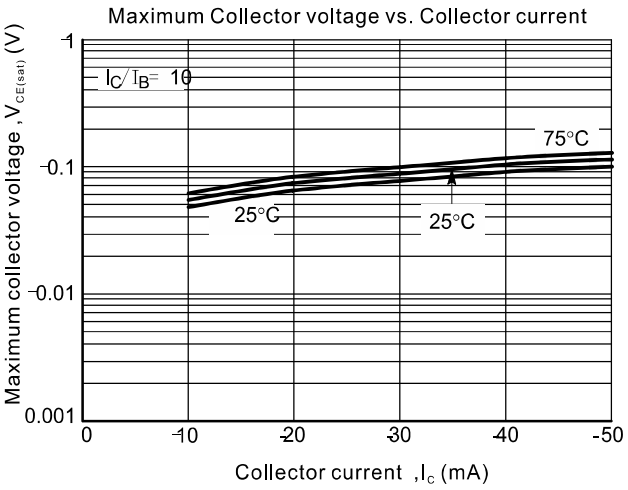


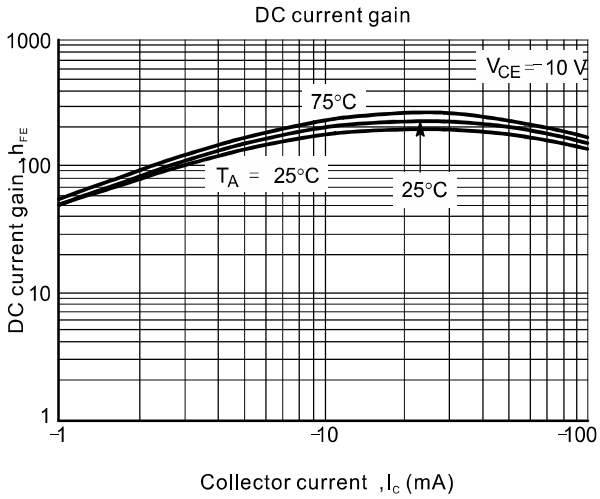
Input current vs. Output voltage

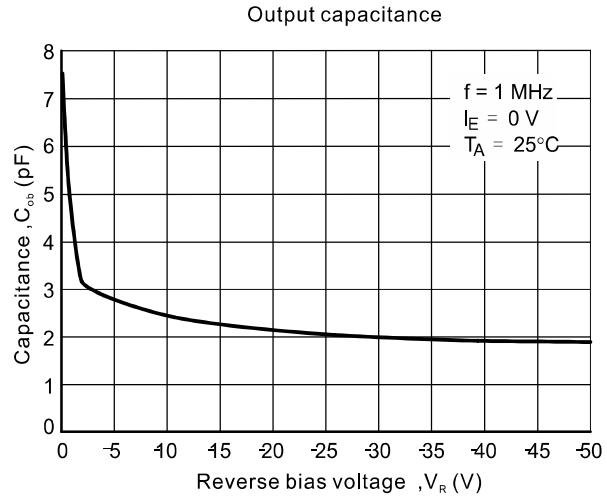


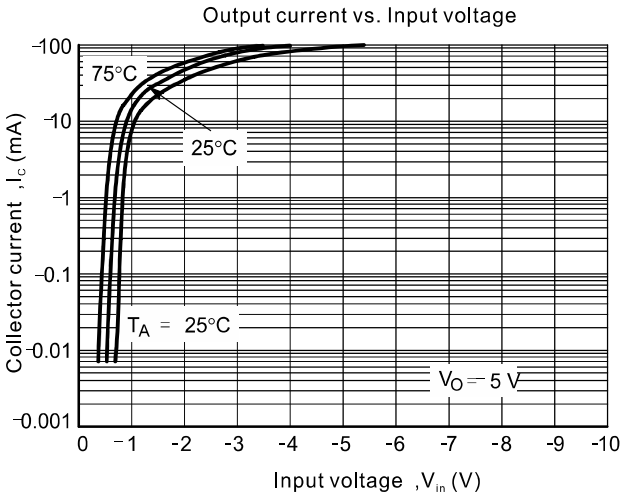
FMUN2111 Thru FMUN2134

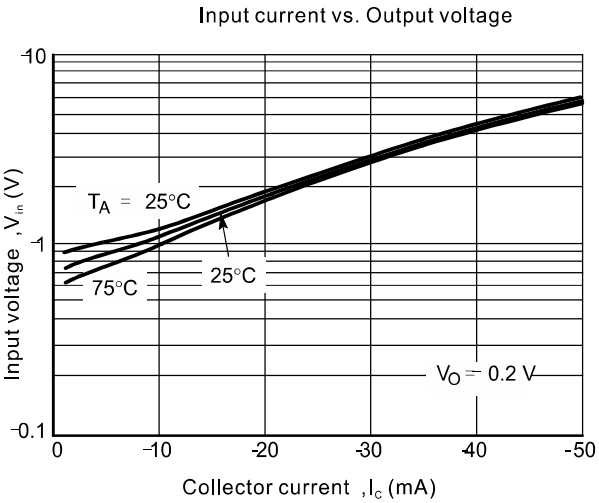
Rating and characteristic curves (FMUN2133)





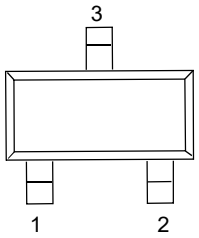
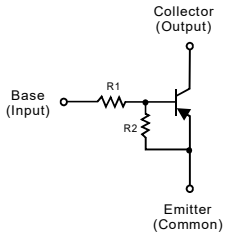






FMUN2111 Thru FMUN2134

Pinning information

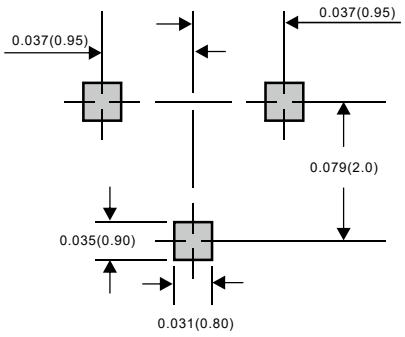
Pin	Simplified outline	Symbol
Pin 1 Base Pin 2 Emitter Pin 3 Collector		

Markingand and Resistor values

Type number	Marking code	R1(KΩ)	R2(KΩ)
FMUN2111	A6A	10	10
FMUN2112	A6B	22	22
FMUN2113	A6C	47	47
FMUN2114	A6D	10	47
FMUN2115	A6E	10	-
FMUN2116	A6F	4.7	-
FMUN2130	A6G	1	1
FMUN2131	A6H	2.2	2.2
FMUN2132	A6J	4.7	4.7
FMUN2133	A6K	4.7	47
FMUN2134	A6L	22	47

Suggested solder pad layout

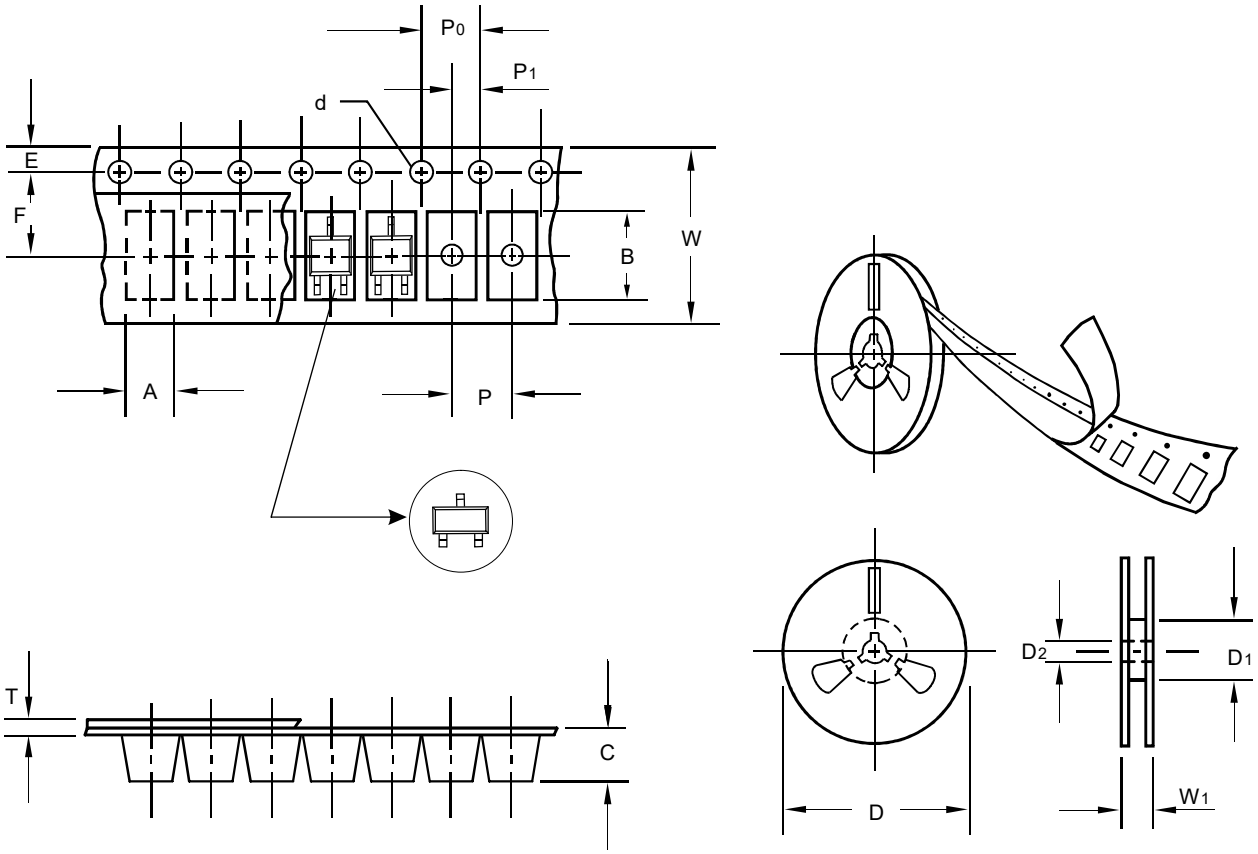
SOT-23



Dimensions in inches and (millimeters)

FMUN2111 Thru FMUN2134

Packing information



unit:mm

Item	Symbol	Tolerance	SOT-23
Carrier width	A	0.1	3.15
Carrier length	B	0.1	2.77
Carrier depth	C	0.1	1.22
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	54.40
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	12.0

Note:Devices are packed in accor dance with EIA standar RS-481-A and specifications listed above.

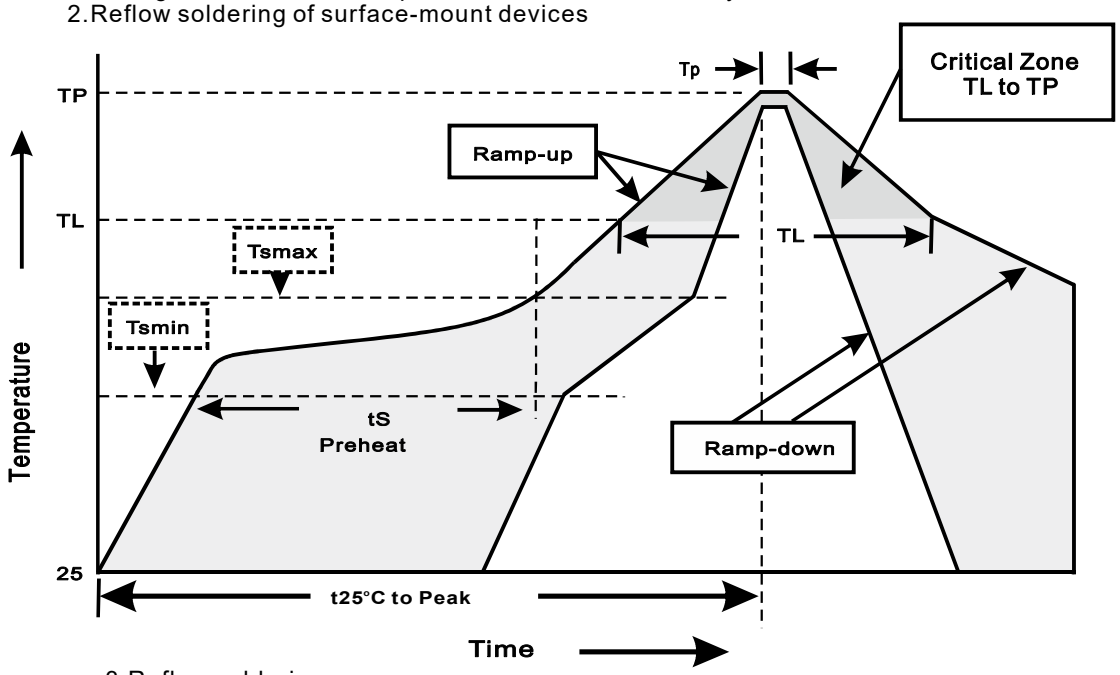
FMUN2111 Thru FMUN2134

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-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

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(Tsmin) -Temperature Max(Tsmax) -Time(min to max)(t_s)	 150°C 200°C 60~120sec
Tsmax 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

FMUN2111 Thru FMUN2134

High reliability test capabilities

Item Test	Conditions
1. Steady State Operating Life	P_D=246mW Test Duration:1000hrs
2. High Temperature Reverse Bias	Tj=150ºC, V_{CE}=80% related volage, 1000hrs
3. Temperature Cycle	−55ºC(15min) to 150ºC(15min)Air to Air Transition Time<20sec Test Cycles:1000cycle
4. Autoclave	P=2atm Ta=121ºC RH=100% Test Duration:96hrs
5. High Temperature Storage Life	Ta=150ºC Test Duration:1000hrs
6. Solderability	245ºC,5sec
7. High Temperature High Humidity Reverse Bias	Ta=85ºC, 85%RH, V_{CE}=80% related volage, 1000hrs
8. Resistance to Soldering Heat	260ºC,10sec
10. Solvent Resistance	