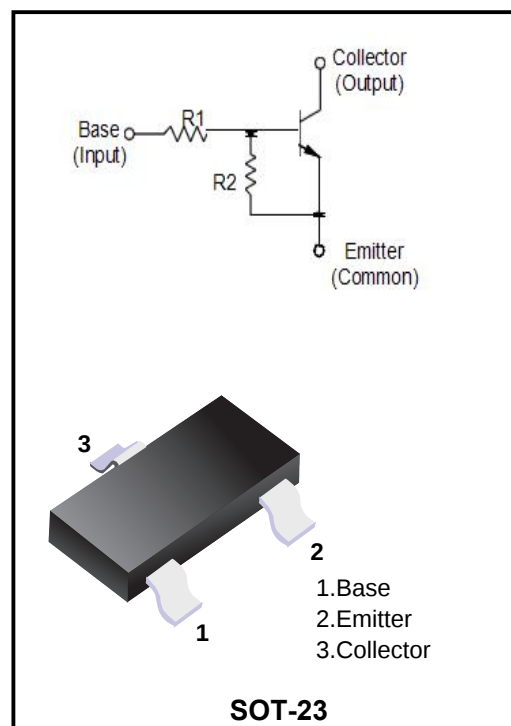


NPN Silicon Epitaxial Planar Transistor

for switching and interface circuit and drive circuit applications

Resistor Values

Type	R1 (K)	R2 (K)	Marking Code
MMUN2211	10	10	11
MMUN2212	22	22	12
MMUN2213	47	47	13
MMUN2214	10	47	14
MMUN2215	10	∞	15
MMUN2216	4.7	∞	16
MMUN2230	1	1	30
MMUN2231	2.2	2.2	31
MMUN2232	4.7	4.7	32
MMUN2233	4.7	47	33
MMUN2234	22	47	34
MMUN2235	2.2	47	35
MMUN2238	2.2	∞	38
MMUN2241	100	∞	41



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Value	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
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_s	- 55 to + 150	°C

Electrical Characteristics (Ta=25℃ unless otherwise specified.)

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain at $V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$				
MMUN2211	h_{FE}	35	-	-
MMUN2212	h_{FE}	60	-	-
MMUN2213	h_{FE}	80	-	-
MMUN2214	h_{FE}	80	-	-
MMUN2215	h_{FE}	160	-	-
MMUN2216	h_{FE}	160	-	-
MMUN2230	h_{FE}	3	-	-
MMUN2231	h_{FE}	8	-	-
MMUN2232	h_{FE}	15	-	-
MMUN2233	h_{FE}	80	-	-
MMUN2234	h_{FE}	80	-	-
MMUN2235	h_{FE}	80	-	-
MMUN2238	h_{FE}	160	-	-
MMUN2241	h_{FE}	160	-	-
Collector Base Cutoff Current at $V_{CB} = 50\text{ V}$	I_{CBO}	-	100	nA
Collector Emitter Cutoff Current at $V_{CE} = 50\text{ V}$	I_{CEO}	-	500	nA
Emitter Base Cutoff Current at $V_{EB} = 6\text{ V}$				
MMUN2211	I_{EBO}	-	0.5	mA
MMUN2212	I_{EBO}	-	0.2	mA
MMUN2213	I_{EBO}	-	0.1	mA
MMUN2214	I_{EBO}	-	0.2	mA
MMUN2215	I_{EBO}	-	0.9	mA
MMUN2216	I_{EBO}	-	1.9	mA
MMUN2230	I_{EBO}	-	4.3	mA
MMUN2231	I_{EBO}	-	2.3	mA
MMUN2232	I_{EBO}	-	1.5	mA
MMUN2233	I_{EBO}	-	0.18	mA
MMUN2234	I_{EBO}	-	0.13	mA
MMUN2235	I_{EBO}	-	0.2	mA
MMUN2238	I_{EBO}	-	4	mA
MMUN2241	I_{EBO}	-	0.1	mA
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	50	-	V
Collector Emitter Breakdown Voltage at $I_C = 2\text{ mA}$	$V_{(BR)CEO}$	50	-	V
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$ at $I_C = 10\text{ mA}$, $I_B = 5\text{ mA}$	V_{CEsat}	-	0.25	V
MMUN2230	V_{CEsat}	-	0.25	V
MMUN2231	V_{CEsat}	-	0.25	V
at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$	V_{CEsat}	-	0.25	V
MMUN2215	V_{CEsat}	-	0.25	V
MMUN2216	V_{CEsat}	-	0.25	V
MMUN2232	V_{CEsat}	-	0.25	V
MMUN2233	V_{CEsat}	-	0.25	V
MMUN2234	V_{CEsat}	-	0.25	V
MMUN2235	V_{CEsat}	-	0.25	V
MMUN2238	V_{CEsat}	-	0.25	V

Electrical Characteristics (Ta=25℃ unless otherwise specified.)

Parameter		Symbol	Min.	Max.	Unit	
Output Voltage (on) at V _{CC} = 5 V, V _B = 2.5 V, R _L = 1 KΩ	MMUN2211	V _{OL}	-	0.2	V	
	MMUN2212	V _{OL}	-	0.2	V	
	MMUN2214	V _{OL}	-	0.2	V	
	MMUN2215	V _{OL}	-	0.2	V	
	MMUN2216	V _{OL}	-	0.2	V	
	MMUN2230	V _{OL}	-	0.2	V	
	MMUN2231	V _{OL}	-	0.2	V	
	MMUN2232	V _{OL}	-	0.2	V	
	MMUN2233	V _{OL}	-	0.2	V	
	MMUN2234	V _{OL}	-	0.2	V	
	MMUN2235	V _{OL}	-	0.2	V	
	MMUN2238	V _{OL}	-	0.2	V	
	at V _{CC} = 5 V, V _B = 3.5 V, R _L = 1 KΩ	MMUN2213	V _{OL}	-	0.2	V
	at V _{CC} = 5 V, V _B = 5 V, R _L = 1 KΩ	MMUN2241	V _{OL}	-	0.2	V
Output Voltage (off) at V _{CC} = 5 V, V _B = 0.5 V, R _L = 1 KΩ at V _{CC} = 5 V, V _B = 0.05 V, R _L = 1 KΩ at V _{CC} = 5 V, V _B = 0.25 V, R _L = 1 KΩ		V _{OH}	4.9	-	V	
	MMUN2230	V _{OH}	4.9	-	V	
	MMUN2215	V _{OH}	4.9	-	V	
	MMUN2216	V _{OH}	4.9	-	V	
	MMUN2233	V _{OH}	4.9	-	V	
	MMUN2238	V _{OH}	4.9	-	V	
Input Resistor	MMUN2211	R1	7	13	KΩ	
	MMUN2212	R1	15.4	28.6	KΩ	
	MMUN2213	R1	32.9	61.1	KΩ	
	MMUN2214	R1	7	13	KΩ	
	MMUN2215	R1	7	13	KΩ	
	MMUN2216	R1	3.3	6.1	KΩ	
	MMUN2230	R1	0.7	1.3	KΩ	
	MMUN2231	R1	1.5	2.9	KΩ	
	MMUN2232	R1	3.3	6.1	KΩ	
	MMUN2233	R1	3.3	6.1	KΩ	
	MMUN2234	R1	15.4	28.6	KΩ	
	MMUN2235	R1	1.54	2.86	KΩ	
	MMUN2238	R1	1.54	2.88	KΩ	
	MMUN2241	R1	70	130	KΩ	
Resistor Ratio	MMUN2211/MMUN2212/MMUN2213	R1/R2	0.8	1.2	-	
	MMUN2214	R1/R2	0.17	0.25	-	
	MMUN2215/MMUN2216/MMUN2238	R1/R2	-	-	-	
	MMUN2241	R1/R2	-	-	-	
	MMUN2230/MMUN2231/MMUN2232	R1/R2	0.8	1.2	-	
	MMUN2233	R1/R2	0.055	0.185	-	
	MMUN2234	R1/R2	0.38	0.56	-	
	MMUN2235	R1/R2	0.038	0.056	-	

Ordering information

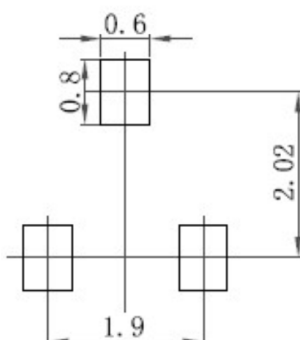
Package	Packing Description	Base Quantity	Packing Quantity
SOT-23	Tape/Reel, 7" reel	3000pcs/Reel	24000PCS/Box 120000PCS/Carton

Package Dimensions

SOT-23

Dim.	Millimeter (mm)		mil	
	Min.	Max.	Min.	Max.
A	0.9	1.15	35	45
A1	0.1		3.9	
bp	0.38	0.48	15	19
C	0.09	0.15	3.54	5.9
D	2.8	3.0	110	118
E	1.2	1.4	47	55
E	1.9		75	
E1	0.95		37	
HE	2.1	2.55	83	100
Lp	0.15	0.45	5.9	18
Q	0.45	0.55	18	22
v	0.2		7.9	
W	0.1		4	

The recommended mounting pad size



Disclaimer

The information presented in this document is for reference only. Guangdong Youfeng Microelectronics Co.,Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise. The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), YFW or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale. This publication supersedes & replaces all information previously supplied. For additional information, please visit our website <https://www.yfwdiode.com>, or consult YFW sales office for further assistance.