

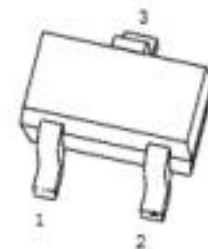


MMUN2211T...MMUN2241T NPN Silicon Epitaxial Planar Transistor

for switching and interface circuit and
drive circuit applications

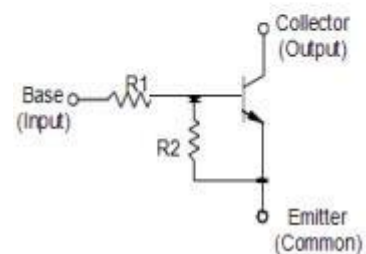
Resistor Values

Type	R1 (K)	R2 (K)	Marking
MMUN2211T	10	10	11
MMUN2212T	22	22	12
MMUN2213T	47	47	13
MMUN2214T	10	47	14
MMUN2215T	10	∞	15
MMUN2216T	4.7	∞	16
MMUN2230T	1	1	30
MMUN2231T	2.2	2.2	31
MMUN2232T	4.7	4.7	32
MMUN2233T	4.7	47	33
MMUN2234T	22	47	34
MMUN2235T	2.2	47	35
MMUN2238T	2.2	∞	38
MMUN2241T	100	∞	41



SOT-523

- 1. IN
- 2. GND
- 3. OUT



Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

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	$^\circ\text{C}$
Storage Temperature Range	T_S	- 55 to + 150	$^\circ\text{C}$



Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Min.	Max.	Unit
DC Current Gain at $V_{CE} = 10\text{ V}$, $I_C = 5\text{ mA}$				
MMUN2211T	h_{FE}	35	-	-
MMUN2212T	h_{FE}	60	-	-
MMUN2213T	h_{FE}	80	-	-
MMUN2214T	h_{FE}	80	-	-
MMUN2215T	h_{FE}	160	-	-
MMUN2216T	h_{FE}	160	-	-
MMUN2230T	h_{FE}	3	-	-
MMUN2231T	h_{FE}	8	-	-
MMUN2232T	h_{FE}	15	-	-
MMUN2233T	h_{FE}	80	-	-
MMUN2234T	h_{FE}	80	-	-
MMUN2235T	h_{FE}	80	-	-
MMUN2238T	h_{FE}	160	-	-
MMUN2241T	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 $V_{EB} = 6\text{ V}$				
MMUN2211T	I_{EBO}	-	0.5	mA
MMUN2212T	I_{EBO}	-	0.2	mA
MMUN2213T	I_{EBO}	-	0.1	mA
MMUN2214T	I_{EBO}	-	0.2	mA
MMUN2215T	I_{EBO}	-	0.9	mA
MMUN2216T	I_{EBO}	-	1.9	mA
MMUN2230T	I_{EBO}	-	4.3	mA
MMUN2231T	I_{EBO}	-	2.3	mA
MMUN2232T	I_{EBO}	-	1.5	mA
MMUN2233T	I_{EBO}	-	0.18	mA
MMUN2234T	I_{EBO}	-	0.13	mA
MMUN2235T	I_{EBO}	-	0.2	mA
MMUN2238T	I_{EBO}	-	4	mA
MMUN2241T	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 $I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$	V_{CEsat}	-	0.25	V
at $I_C = 10\text{ mA}$, $I_B = 5\text{ mA}$	V_{CEsat}	-	0.25	V
MMUN2230T	V_{CEsat}	-	0.25	V
MMUN2231T	V_{CEsat}	-	0.25	V
at $I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$	V_{CEsat}	-	0.25	V
MMUN2215T	V_{CEsat}	-	0.25	V
MMUN2216T	V_{CEsat}	-	0.25	V
MMUN2232T	V_{CEsat}	-	0.25	V
MMUN2233T	V_{CEsat}	-	0.25	V
MMUN2234T	V_{CEsat}	-	0.25	V
MMUN2235T	V_{CEsat}	-	0.25	V
MMUN2238T	V_{CEsat}	-	0.25	V

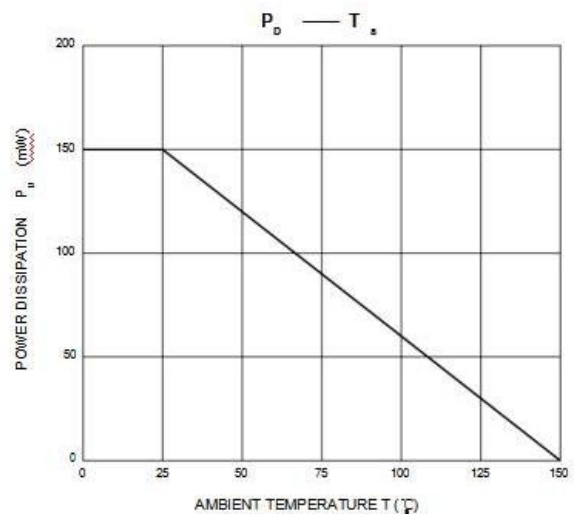
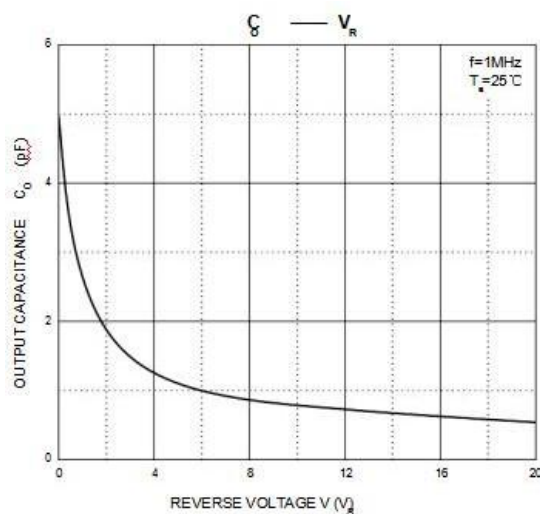
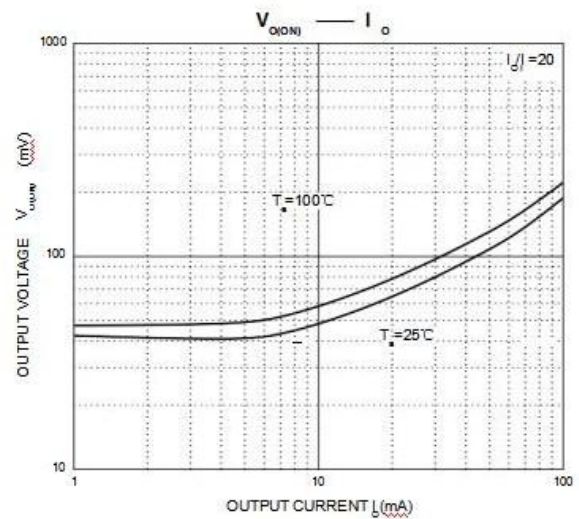
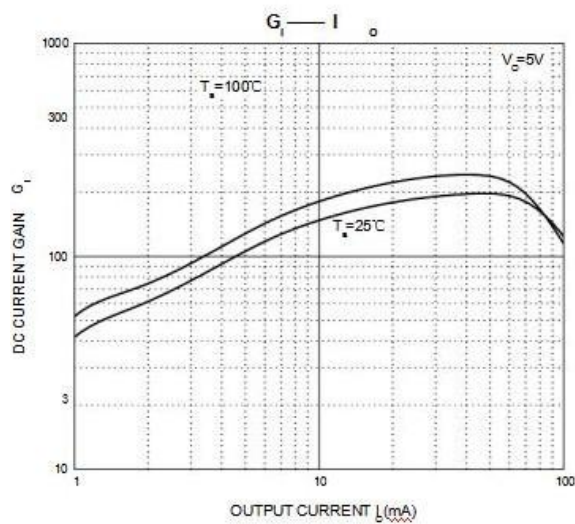
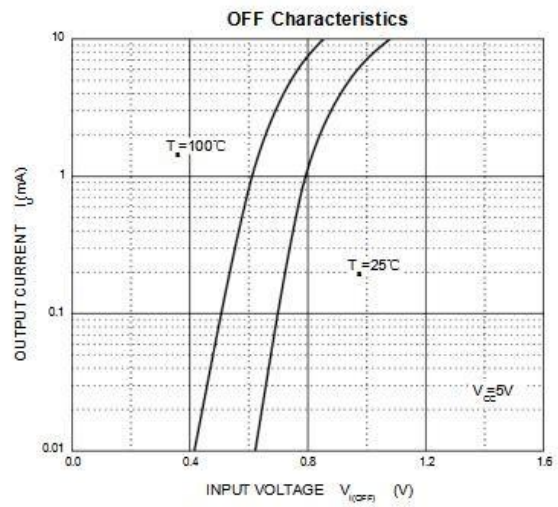
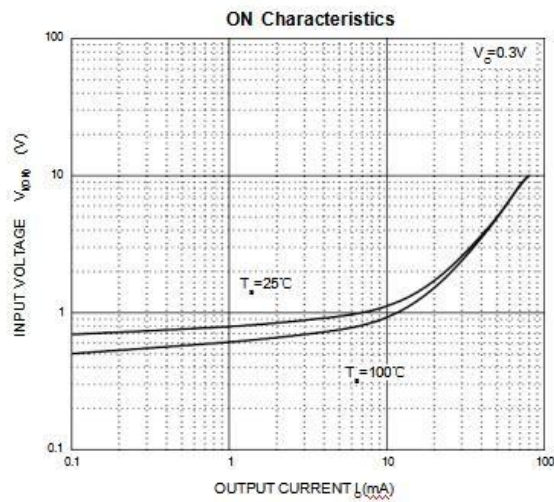


Characteristics at $T_a = 25\text{ }^{\circ}\text{C}$

Parameter	Symbol	Min.	Max.	Unit
Output Voltage (on) at $V_{CC} = 5\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1\text{ K}\Omega$	MMUN2211T V_{OL}	-	0.2	V
	MMUN2212T V_{OL}	-	0.2	V
	MMUN2214T V_{OL}	-	0.2	V
	MMUN2215T V_{OL}	-	0.2	V
	MMUN2216T V_{OL}	-	0.2	V
	MMUN2230T V_{OL}	-	0.2	V
	MMUN2231T V_{OL}	-	0.2	V
	MMUN2232T V_{OL}	-	0.2	V
	MMUN2233T V_{OL}	-	0.2	V
	MMUN2234T V_{OL}	-	0.2	V
	MMUN2235T V_{OL}	-	0.2	V
	MMUN2238T V_{OL}	-	0.2	V
at $V_{CC} = 5\text{ V}$, $V_B = 3.5\text{ V}$, $R_L = 1\text{ K}\Omega$	MMUN2213T V_{OL}	-	0.2	V
at $V_{CC} = 5\text{ V}$, $V_B = 5\text{ V}$, $R_L = 1\text{ K}\Omega$	MMUN2241T V_{OL}	-	0.2	V
Output Voltage (off) at $V_{CC} = 5\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1\text{ K}\Omega$	V_{OH}	4.9	-	V
at $V_{CC} = 5\text{ V}$, $V_B = 0.05\text{ V}$, $R_L = 1\text{ K}\Omega$	MMUN2230T V_{OH}	4.9	-	V
at $V_{CC} = 5\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1\text{ K}\Omega$	MMUN2215T V_{OH}	4.9	-	V
	MMUN2216T V_{OH}	4.9	-	V
	MMUN2233T V_{OH}	4.9	-	V
	MMUN2238T V_{OH}	4.9	-	V
Input Resistor	MMUN2211T R1	7	13	K Ω
	MMUN2212T R1	15.4	28.6	K Ω
	MMUN2213T R1	32.9	61.1	K Ω
	MMUN2214T R1	7	13	K Ω
	MMUN2215T R1	7	13	K Ω
	MMUN2216T R1	3.3	6.1	K Ω
	MMUN2230T R1	0.7	1.3	K Ω
	MMUN2231T R1	1.5	2.9	K Ω
	MMUN2232T R1	3.3	6.1	K Ω
	MMUN2233T R1	3.3	6.1	K Ω
	MMUN2234T R1	15.4	28.6	K Ω
	MMUN2235T R1	1.54	2.86	K Ω
	MMUN2238T R1	1.54	2.88	K Ω
	MMUN2241T R1	70	130	K Ω
ResistorRatio	R1/R2	0.8	1.2	-
MMUN2211T/MMUN2212T/MMUN2213T				
MMUN2214T	R1/R2	0.17	0.25	-
MMUN2215T/MMUN2216T/MMUN2238T	R1/R2	-	-	-
MMUN2241T	R1/R2	-	-	-
MMUN2230T/MMUN2231T/MMUN2232T	R1/R2	0.8	1.2	-
MMUN2233T	R1/R2	0.055	0.185	-
MMUN2234T	R1/R2	0.38	0.56	-
MMUN2235T	R1/R2	0.038	0.056	-

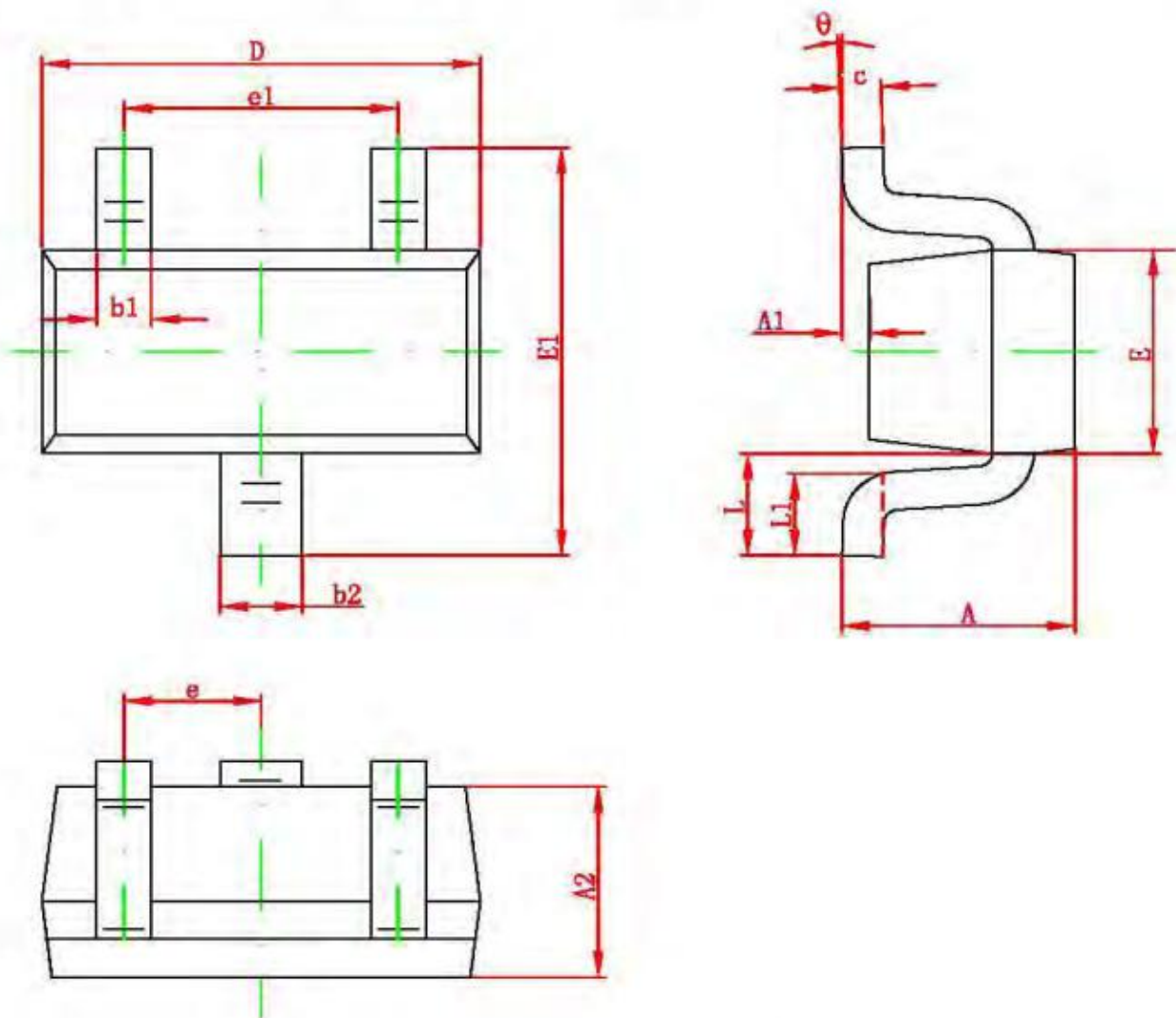


Typical Characteristics





SOT-523 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400 REF.		0.016 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°