



DATA SHEET

SEMICONDUCTOR

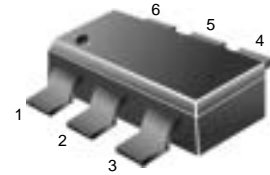
MUN5211DW Series

Dual Bias Resistor Transistors

NPN Silicon Surface Mount Transistors with Monolithic Bias Resistor Network



The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base-emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the LMUN5211DW1T1 series, two BRT devices are housed in the SOT-363 package which is ideal for low power surface mount applications where board space is at a premium.

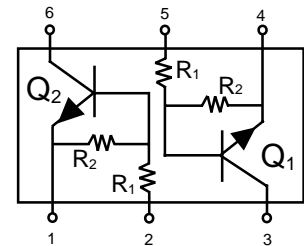


SC-88/SOT-363

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Pb-Free Package is available

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted, common for Q₁ and Q₂)

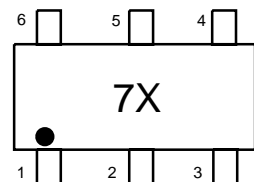
Rating	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	50	Vdc
Collector-Emitter Voltage	V _{CEO}	50	Vdc
Collector Current	I _C	100	mAdc



THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C	P _D	187 (Note 1.) 256 (Note 2.)	mW
Derate above 25°C		1.5 (Note 1.) 2.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	R _{θJA}	670 (Note 1.) 490 (Note 2.)	°C/W
Characteristic (Both Junctions Heated)	Symbol	Max	Unit
Total Device Dissipation T _A = 25°C	P _D	250 (Note 1.) 385 (Note 2.)	mW
Derate above 25°C		2.0 (Note 1.) 3.0 (Note 2.)	mW/°C
Thermal Resistance – Junction-to-Ambient	R _{θJA}	493 (Note 1.) 325 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	R _{θJL}	188 (Note 1.) 208 (Note 2.)	°C/W
Junction and Storage Temperature	T _J , T _{stg}	-55 to +150	°C

MARKING DIAGRAM



7X = Device Marking
(See Page 2)

DEVICE MARKING INFORMATION

See specific marking information in the device marking table on page 2 of this data sheet.

1. FR-4 @ Minimum Pad 2. FR-4 @ 1.0 x 1.0 inch Pad

ELECTRICAL CHARACTERISTICS

MUN5211DW Series

ELECTRICAL CHARACTERISTICS

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

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS						
Collector-Base Cutoff Current ($V_{CB} = 50\text{ V}, I_E = 0$)	I_{CBO}	–	–	100	nAdc	
Collector-Emitter Cutoff Current ($V_{CE} = 50\text{ V}, I_B = 0$)	I_{CEO}	–	–	500	nAdc	
Emitter-Base Cutoff Current ($V_{EB} = 6.0\text{ V}, I_C = 0$)	MUN5211DW	I_{EBO}	–	–	0.5	mAdc
	MUN5212DW		–	–	0.2	
	MUN5213DW		–	–	0.1	
	MUN5214DW		–	–	0.2	
	MUN5215DW		–	–	0.9	
	MUN5216DW		–	–	1.9	
	MUN5230DW		–	–	4.3	
	MUN5231DW		–	–	2.3	
	MUN5232DW		–	–	1.5	
	MUN5233DW		–	–	0.18	
	MUN5234DW		–	–	0.13	
	MUN5235DW		–	–	0.2	
	MUN5236DW		–	–	0.05	
	MUN5237DW		–	–	0.13	
Collector-Base Breakdown Voltage ($I_C = 10\ \mu\text{A}, I_E = 0$)	$V_{(BR)CBO}$	50	–	–	Vdc	
Collector-Emitter Breakdown Voltage(Note 4.)($I_C = 2.0\text{ mA}, I_B = 0$)	$V_{(BR)CEO}$	50	–	–	Vdc	

4. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%

ELECTRICAL CHARACTERISTICS

MUN5211DW Series

ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted, common for Q₁ and Q₂.) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 5.)					
DC Current Gain ($V_{CE} = 10\text{ V}$, $I_C = 5.0\text{ mA}$)	MUN5211DW	h_{FE}	35	60	–
	MUN5212DW		60	100	–
	MUN5213DW		80	140	–
	MUN5214DW		80	140	–
	MUN5215DW		160	350	–
	MUN5216DW		160	350	–
	MUN5230DW		3.0	5.0	–
	MUN5231DW		8.0	15	–
	MUN5232DW		15	30	–
	MUN5233DW		80	200	–
	MUN5234DW		80	150	–
	MUN5235DW		80	140	–
	MUN5236DW		80	150	–
	MUN5237DW		80	140	–
Collector-Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$) ($I_C = 10\text{ mA}$, $I_B = 5\text{ mA}$) ($I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$)	$V_{CE(sat)}$	–	–	0.25	Vdc
MUN5230DW/MUN5231DW MUN5215DW/MUN5216DW MUN5232D/MUN5233DW/MUN5234DW					
Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	V_{OL}	–	–	0.2	Vdc
MUN5211DW		–	–	0.2	
MUN5212DW		–	–	0.2	
MUN5214DW		–	–	0.2	
MUN5215DW		–	–	0.2	
MUN5216DW		–	–	0.2	
MUN5230DW		–	–	0.2	
MUN5231DW		–	–	0.2	
MUN5232DW		–	–	0.2	
MUN5233DW		–	–	0.2	
MUN5234DW		–	–	0.2	
MUN5235DW		–	–	0.2	
($V_{CC} = 5.0\text{ V}$, $V_B = 3.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5213DW		–	0.2	
($V_{CC} = 5.0\text{ V}$, $V_B = 5.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5236DW		–	0.2	
($V_{CC} = 5.0\text{ V}$, $V_B = 4.0\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	MUN5237DW		–	0.2	
Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.05\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	V_{OH}	4.9	–	–	Vdc
MUN5230DW					
MUN5215DW					
MUN5216DW					
MUN5233DW					

5. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

ELECTRICAL CHARACTERISTICS

MUN5211DW Series

ELECTRICAL CHARACTERISTICS

(T_A = 25°C unless otherwise noted, common for Q₁ and Q₂.) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS (Note 6.)						
Input Resistor	MUN5211DW	R ₁	7.0	10	13	kΩ
	MUN5212DW		15.4	22	28.6	
	MUN5213DW		32.9	47	61.1	
	MUN5214DW		7.0	10	13	
	MUN5215DW		7.0	10	13	
	MUN5216DW		3.3	4.7	6.1	
	MUN5230DW		0.7	1.0	1.3	
	MUN5231DW		1.5	2.2	2.9	
	MUN5232DW		3.3	4.7	6.1	
	MUN5233DW		3.3	4.7	6.1	
	MUN5234DW		15.4	22	28.6	
	MUN5235DW		1.54	2.2	2.86	
	MUN5236DW		70	100	130	
	MUN5237DW		32.9	47	61.1	
Resistor Ratio	MUN5211DW/MUN5212DW	R ₁ /R ₂				
	MUN5213DW/MUN5236DW		0.8	1.0	1.2	
	MUN5214DW/MUN5215DW		0.17	0.21	0.25	
	MUN5216DW/MUN5230DW		–	–	–	
	MUN5231DW/MUN5232DW		0.8	1.0	1.2	
	MUN5233DW		0.055	0.1	0.185	
	MUN5234DW		0.38	0.47	0.56	
	MUN5235DW		0.038	0.047	0.056	
	MUN5237DW		1.7	2.1	2.6	

6. Pulse Test: Pulse Width < 300 ms, Duty Cycle < 2.0%

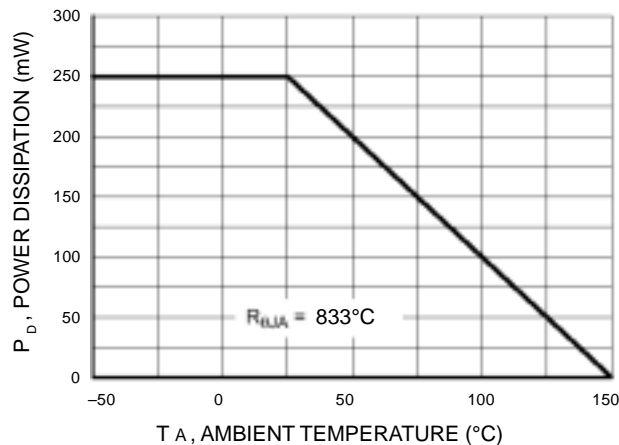


Figure 1. Derating Curve

DEVICE CHARACTERISTICS

MUN5211DW Series

TYPICAL ELECTRICAL CHARACTERISTICS –MUN5211DW

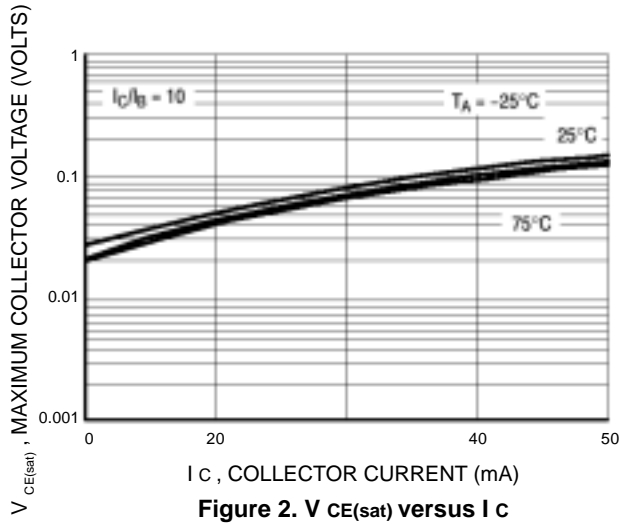


Figure 2. $V_{CE(sat)}$ versus I_c

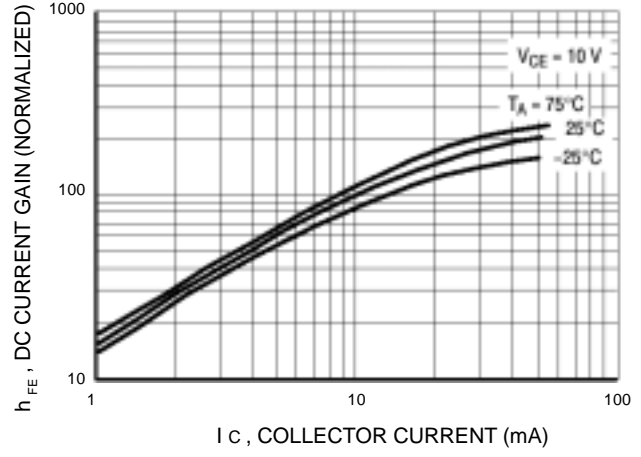


Figure 3. DC Current Gain

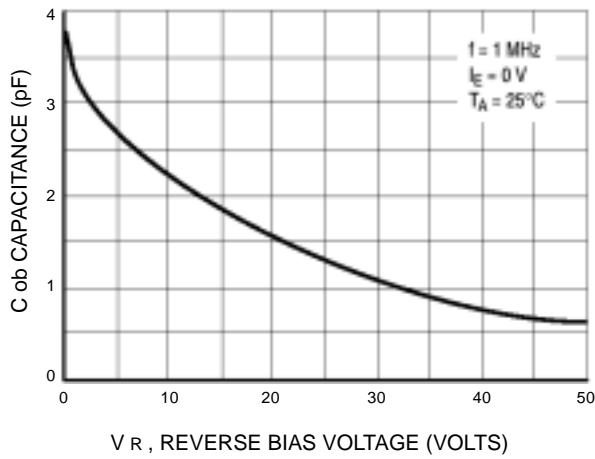


Figure 4. Output Capacitance

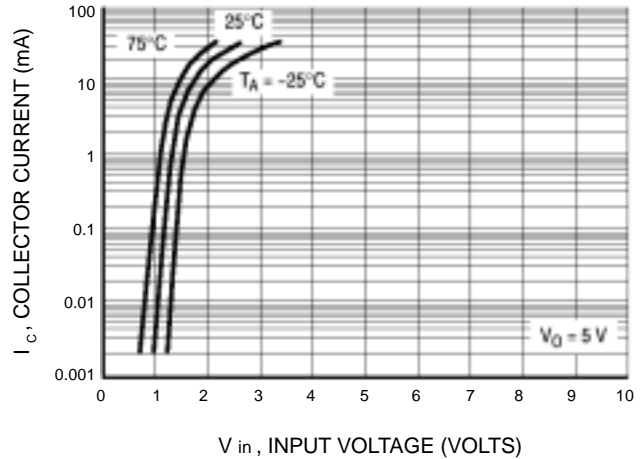


Figure 5. Output Current versus Input Voltage

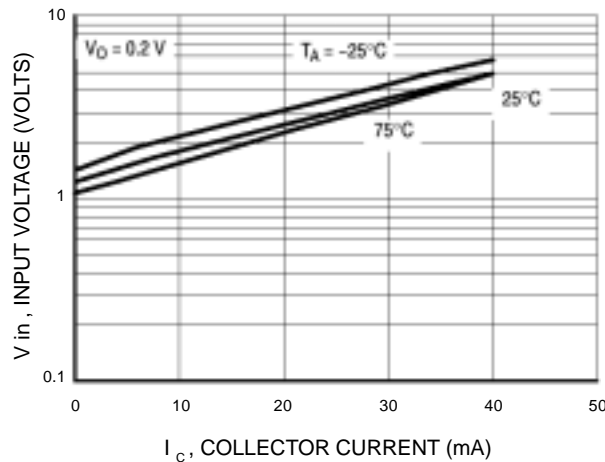
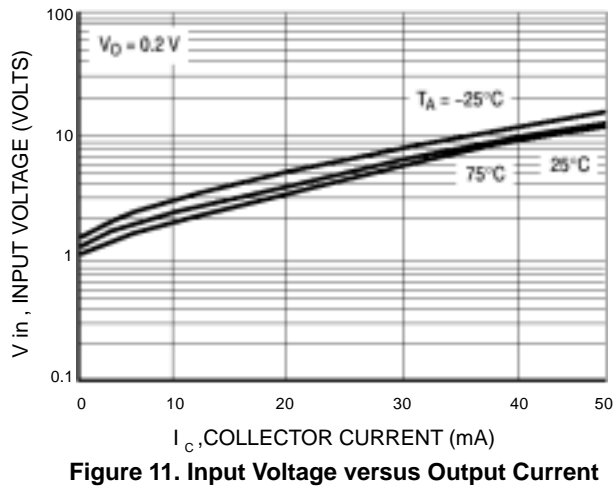
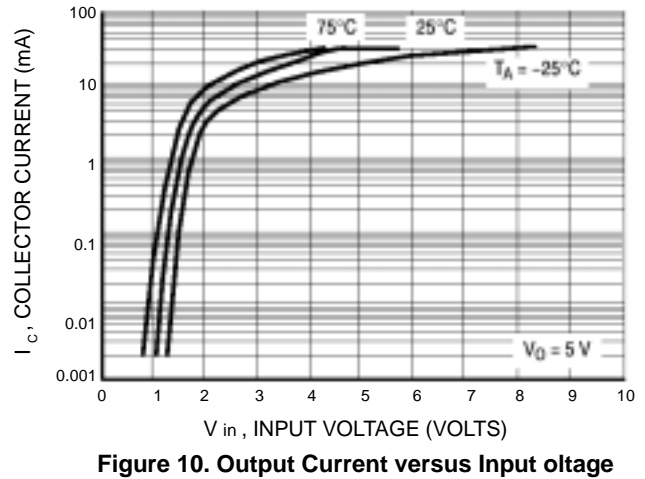
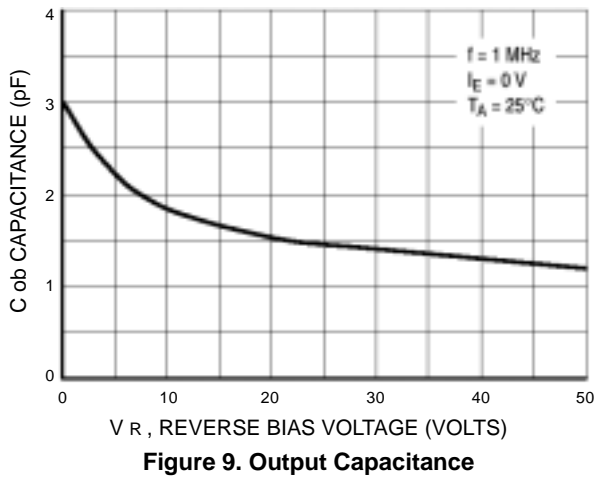
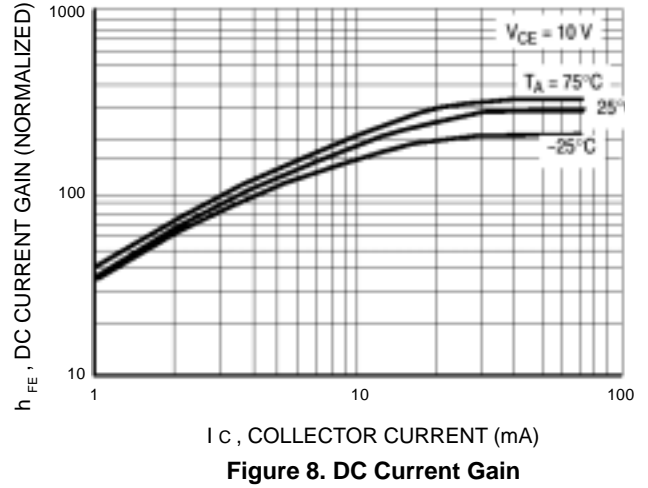
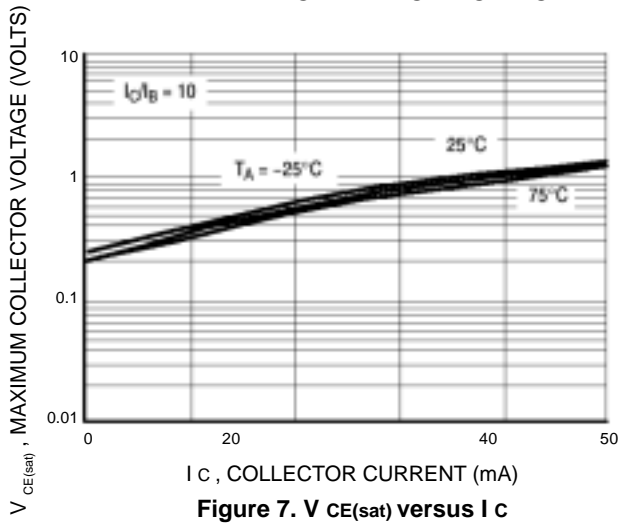


Figure 6. Input Voltage versus Output Current

DEVICE CHARACTERISTICS

MUN5211DW Series

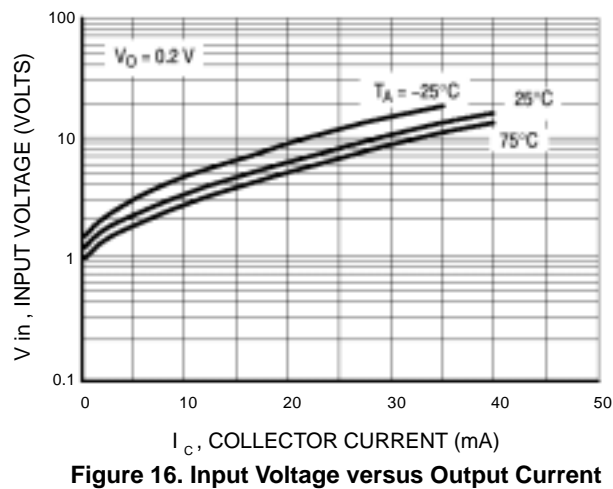
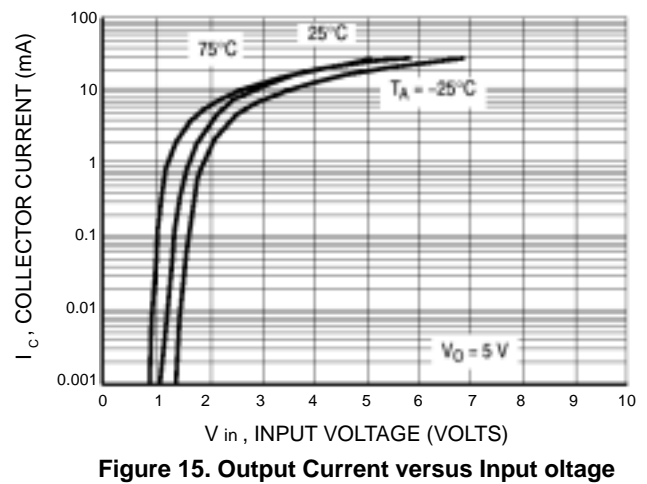
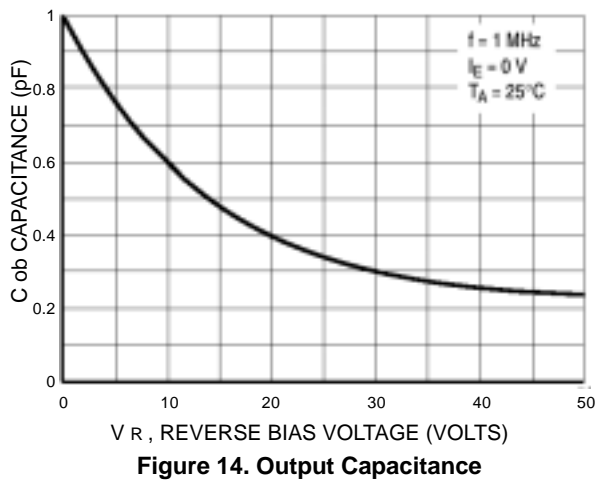
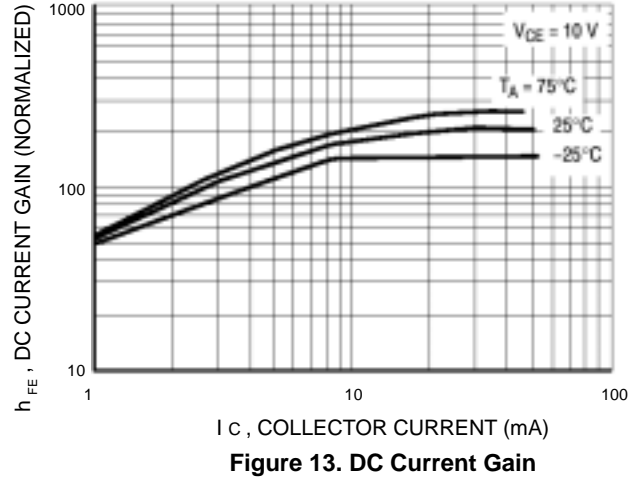
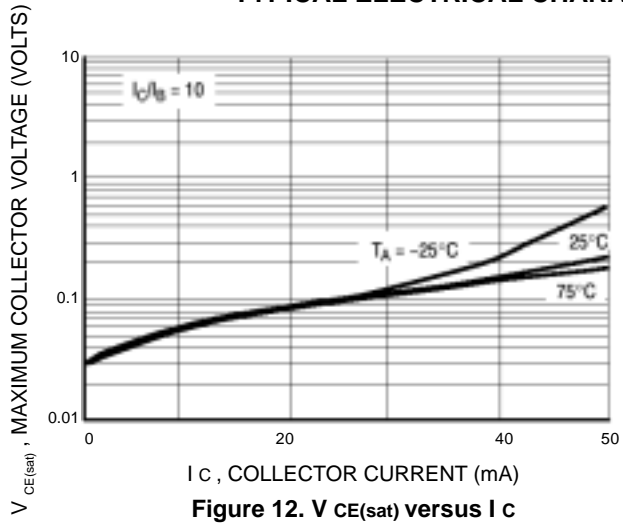
TYPICAL ELECTRICAL CHARACTERISTICS – MUN5212DW



DEVICE CHARACTERISTICS

MUN5211DW Series

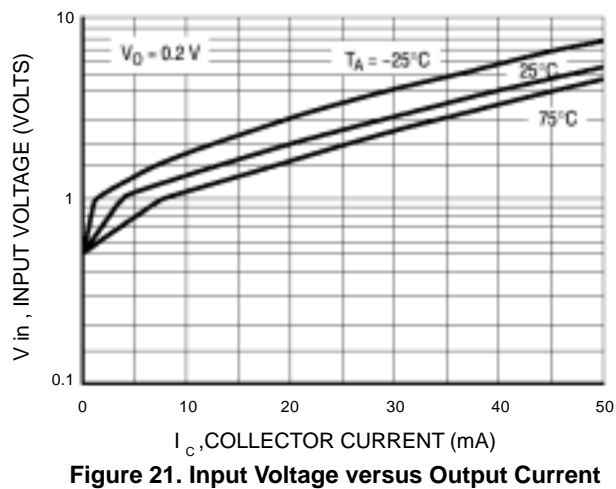
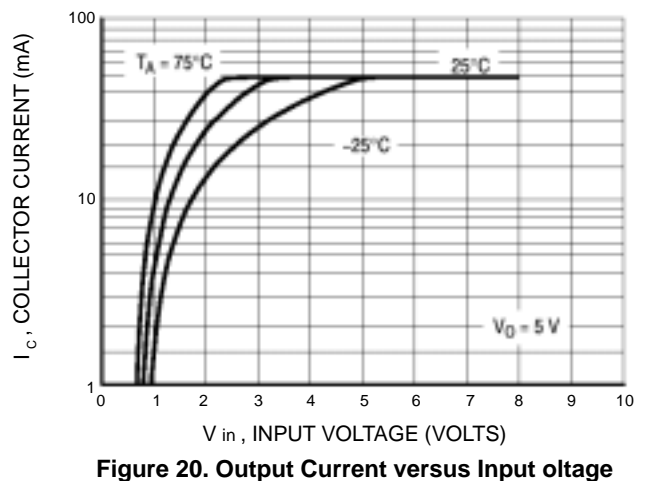
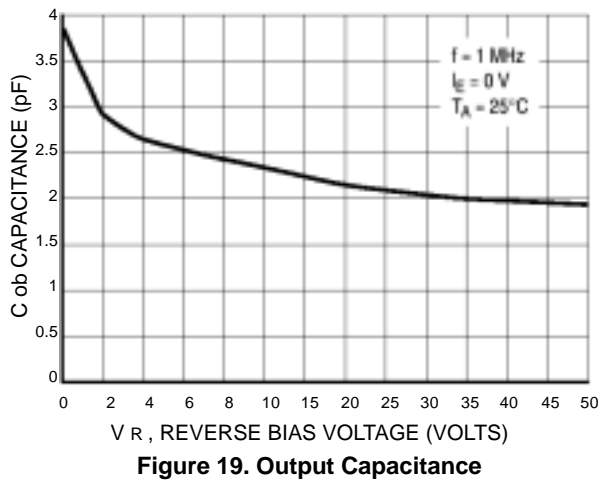
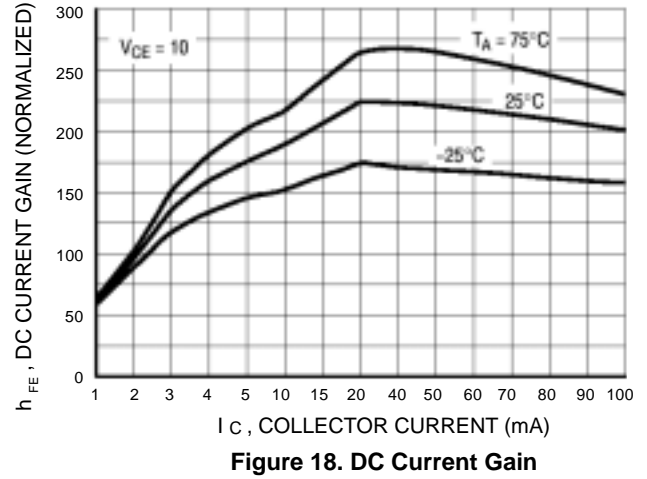
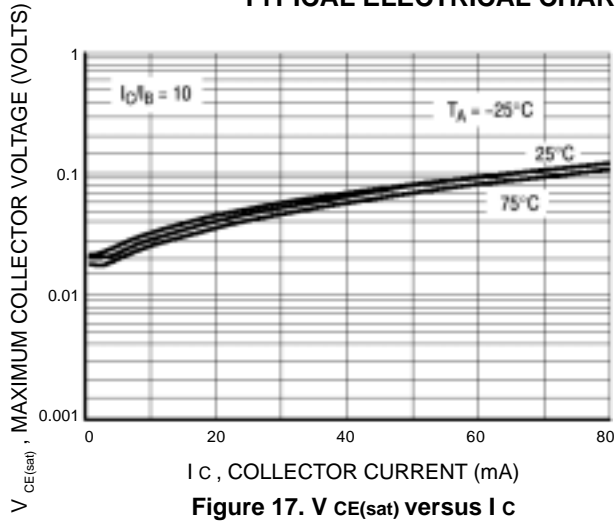
TYPICAL ELECTRICAL CHARACTERISTICS – MUN5213DW



DEVICE CHARACTERISTICS

MUN5211DW Series

TYPICAL ELECTRICAL CHARACTERISTICS – MUN5214DW



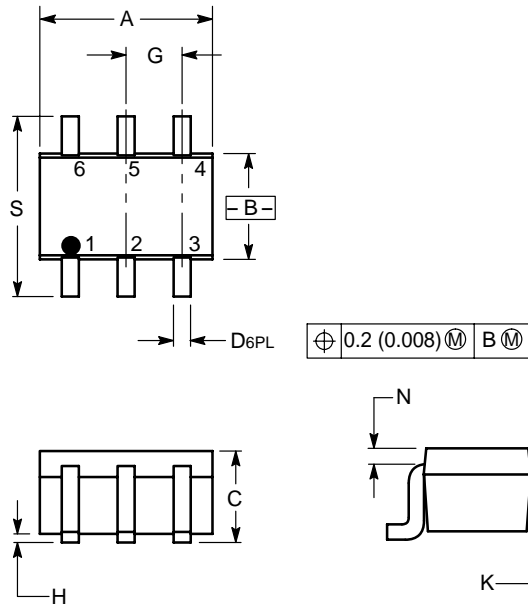
PACKAGE OUTLINE & DIMENSIONS

MUN5211DW Series

SC-88/SOT-363

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

- PIN 1. EMITTER 2
 2. BASE 2
 3. COLLECTOR 1
 4. EMITTER 1
 5. BASE 1
 6. COLLECTOR 2

