

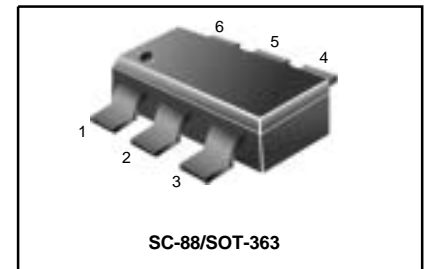
# Dual Bias Resistor Transistors

## 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.

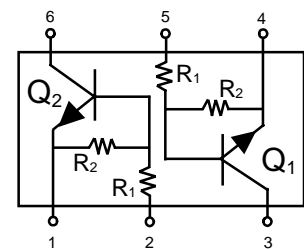
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

**LMUN5211DW1T1G**  
**Series**  
**S-LMUN5211DW1T1G**  
**Series**



### MAXIMUM RATINGS (T<sub>A</sub> = 25°C unless otherwise noted, common for Q<sub>1</sub> and Q<sub>2</sub>)

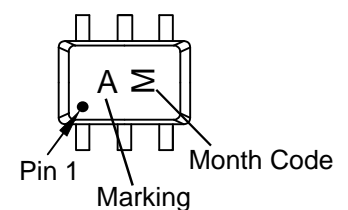
Rating	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CBO</sub>	50	Vdc
Collector-Emitter Voltage	V <sub>CEO</sub>	50	Vdc
Emitter-Base Breakdown Voltage	V <sub>EBO</sub>	6	Vdc
Collector Current	I <sub>C</sub>	100	mAdc



### THERMAL CHARACTERISTICS

Characteristic (One Junction Heated)	Symbol	Max	Unit
Total Device Dissipation T <sub>A</sub> = 25°C	P <sub>D</sub>	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 <sub>θJA</sub>	670 (Note 1.) 490 (Note 2.)	°C/W
Characteristic (Both Junctions Heated)	Symbol	Max	Unit
Total Device Dissipation T <sub>A</sub> = 25°C	P <sub>D</sub>	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 <sub>θJA</sub>	493 (Note 1.) 325 (Note 2.)	°C/W
Thermal Resistance – Junction-to-Lead	R <sub>θJL</sub>	188 (Note 1.) 208 (Note 2.)	°C/W
Junction and Storage Temperature	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

### MARKING DIAGRAM



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

LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

DEVICE MARKING , RESISTOR VALUES AND ORDERING INFORMATION

Device	Package	Marking	R1(K)	R2(K)	Vin(V)	Shipping
LMUN5211DW1T1G	SC88	7A	10	10	-10~+40	3000/Tape&Reel
LMUN5211DW1T3G						10000/Tape&Reel
LMUN5212DW1T1G	SC88	7B	22	22	-10~+40	3000/Tape&Reel
LMUN5212DW1T3G						10000/Tape&Reel
LMUN5213DW1T1G	SC88	7C	47	47	-10~+40	3000/Tape&Reel
LMUN5213DW1T3G						10000/Tape&Reel
LMUN5214DW1T1G	SC88	7D	10	47	-6~+40	3000/Tape&Reel
LMUN5214DW1T3G						10000/Tape&Reel
LMUN5215DW1T1G	SC88	7E	10	∞	-6~+40	3000/Tape&Reel
LMUN5215DW1T3G						10000/Tape&Reel
LMUN5216DW1T1G	SC88	7F	4.7	∞	-6~+30	3000/Tape&Reel
LMUN5216DW1T3G						10000/Tape&Reel
LMUN5230DW1T1G	SC88	7G	1.0	1.0	-10~+10	3000/Tape&Reel
LMUN5230DW1T3G						10000/Tape&Reel
LMUN5231DW1T1G	SC88	7H	2.2	2.2	-10~+12	3000/Tape&Reel
LMUN5231DW1T3G						10000/Tape&Reel
LMUN5232DW1T1G	SC88	7J	4.7	4.7	-10~+30	3000/Tape&Reel
LMUN5232DW1T3G						10000/Tape&Reel
LMUN5233DW1T1G	SC88	7K	4.7	47	-5~+30	3000/Tape&Reel
LMUN5233DW1T3G						10000/Tape&Reel
LMUN5234DW1T1G	SC88	7L	22	47	-8~+40	3000/Tape&Reel
LMUN5234DW1T3G						10000/Tape&Reel
LMUN5235DW1T1G	SC88	7M	2.2	47	-6~+12	3000/Tape&Reel
LMUN5235DW1T3G						10000/Tape&Reel
LMUN5236DW1T1G	SC88	7N	100	100	-10~+40	3000/Tape&Reel
LMUN5236DW1T3G						10000/Tape&Reel
LMUN5237DW1T1G	SC88	7P	47	22	-10~+40	3000/Tape&Reel
LMUN5237DW1T3G						10000/Tape&Reel

LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted, common for Q<sub>1</sub> and Q<sub>2</sub>)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
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 ( $V_{EB} = 6.0\text{ V}$ , $I_C = 0$ )	$I_{EBO}$	–	–	0.5	mAdc
MUN5211DW1T1, G		–	–	0.2	
MUN5212DW1T1, G		–	–	0.1	
MUN5213DW1T1, G		–	–	0.2	
MUN5214DW1T1, G		–	–	0.9	
MUN5215DW1T1, G		–	–	1.9	
MUN5216DW1T1, G		–	–	4.3	
MUN5230DW1T1, G		–	–	2.3	
MUN5231DW1T1, G		–	–	1.5	
MUN5232DW1T1, G		–	–	0.18	
MUN5233DW1T1, G		–	–	0.13	
MUN5234DW1T1, G		–	–	0.2	
MUN5235DW1T1, G		–	–	0.05	
MUN5236DW1T1, G		–	–	0.13	
MUN5237DW1T1, G		–	–		
Collector-Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ , $I_E = 0$ )	$V_{(BR)CBO}$	50	–	–	Vdc
Collector-Emitter Breakdown Voltage (Note 3) ( $I_C = 2.0\text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	50	–	–	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 200\ \mu\text{A}$ , $I_C = 0$ )	$V_{(BR)EBO}$	6	–	–	Vdc

3. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%

**ON CHARACTERISTICS** (Note 4)

DC Current Gain ( $V_{CE} = 10\text{ V}$ , $I_C = 5.0\text{ mA}$ )	$h_{FE}$	35	60	–	
MUN5211DW1T1, G		60	100	–	
MUN5212DW1T1, G		80	140	–	
MUN5213DW1T1, G		80	140	–	
MUN5214DW1T1, G		160	350	–	
MUN5215DW1T1, G		160	350	–	
MUN5230DW1T1, G		3.0	5.0	–	
MUN5231DW1T1, G		8.0	15	–	
MUN5232DW1T1, G		15	30	–	
MUN5233DW1T1, G		80	200	–	
MUN5234DW1T1, G		80	150	–	
MUN5235DW1T1, G		80	140	–	
MUN5236DW1T1, G		80	150	–	
MUN5237DW1T1, G		80	140	–	

LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

**ELECTRICAL CHARACTERISTICS**

Collector-Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.3\text{ mA}$ )  ( $I_C = 10\text{ mA}$ , $I_B = 5\text{ mA}$ )  ( $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ )	MUN5211DW1T1, G	$V_{CE(sat)}$	-	-	0.25	Vdc
	MUN5212DW1T1, G		-	-	0.25	
	MUN5213DW1T1, G		-	-	0.25	
	MUN5214DW1T1, G		-	-	0.25	
	MUN5236DW1T1, G		-	-	0.25	
	MUN5230DW1T1, G		-	-	0.25	
	MUN5231DW1T1, G		-	-	0.25	
	MUN5237DW1T1, G		-	-	0.25	
	MUN5215DW1T1, G		-	-	0.25	
	MUN5216DW1T1, G		-	-	0.25	
	MUN5232DW1T1, G		-	-	0.25	
	MUN5233DW1T1, G		-	-	0.25	
	MUN5234DW1T1, G		-	-	0.25	
	MUN5235DW1T1, G		-	-	0.25	
Output Voltage (on) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 2.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )  ( $V_{CC} = 5.0\text{ V}$ , $V_B = 3.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 5.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 4.0\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5211DW1T1, G	$V_{OL}$	-	-	0.2	Vdc
	MUN5212DW1T1, G		-	-	0.2	
	MUN5214DW1T1, G		-	-	0.2	
	MUN5215DW1T1, G		-	-	0.2	
	MUN5216DW1T1, G		-	-	0.2	
	MUN5230DW1T1, G		-	-	0.2	
	MUN5231DW1T1, G		-	-	0.2	
	MUN5232DW1T1, G		-	-	0.2	
	MUN5233DW1T1, G		-	-	0.2	
	MUN5234DW1T1, G		-	-	0.2	
	MUN5235DW1T1, G		-	-	0.2	
	MUN5213DW1T1, G		-	-	0.2	
	MUN5236DW1T1, G		-	-	0.2	
	MUN5237DW1T1, G		-	-	0.2	

4. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%

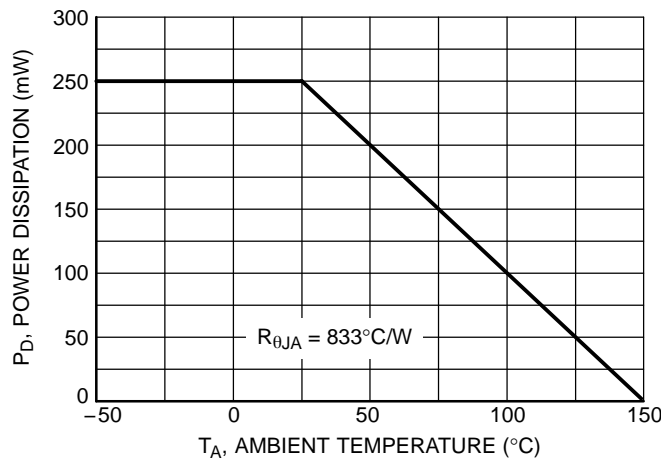
**LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series**

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

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>ON CHARACTERISTICS</b> (Note 5) (Continued)						
Output Voltage (off) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 0.5\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )  ( $V_{CC} = 5.0\text{ V}$ , $V_B = 0.050\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ ) ( $V_{CC} = 5.0\text{ V}$ , $V_B = 0.25\text{ V}$ , $R_L = 1.0\text{ k}\Omega$ )	MUN5211DW1T1, G MUN5212DW1T1, G MUN5213DW1T1, G MUN5214DW1T1, G MUN5233DW1T1, G MUN5234DW1T1, G MUN5235DW1T1, G MUN5230DW1T1, G MUN5215DW1T1, G MUN5216DW1T1, G MUN5231DW1T1, G MUN5232DW1T1, G MUN5236DW1T1, G MUN5237DW1T1, G	$V_{OH}$	4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4.9	– – – – – – – – – – – – – –	– – – – – – – – – – – – – –	Vdc
Input Resistor	MUN5211DW1T1, G MUN5212DW1T1, G MUN5213DW1T1, G MUN5214DW1T1, G MUN5215DW1T1, G MUN5216DW1T1, G MUN5230DW1T1, G MUN5231DW1T1, G MUN5232DW1T1, G MUN5233DW1T1, G MUN5234DW1T1, G MUN5235DW1T1, G MUN5236DW1T1, G MUN5237DW1T1, G	R1	7.0 15.4 32.9 7.0 7.0 3.3 0.7 1.5 3.3 3.3 15.4 1.54 70 32.9	10 22 47 10 10 4.7 1.0 2.2 4.7 4.7 22 2.2 100 47	13 28.6 61.1 13 13 6.1 1.3 2.9 6.1 6.1 28.6 2.86 130 61.1	k $\Omega$
Resistor Ratio	MUN5211DW1T1, G/MUN5212DW1T1, G/ MUN5213DW1T1, G/MUN5236DW1T1, G MUN5214DW1T1, G MUN5215DW1T1, G/MUN5216DW1T1, G MUN5230DW1T1, G/MUN5231DW1T1, G/MUN5232DW1T1, G MUN5233DW1T1, G MUN5234DW1T1, G MUN5235DW1T1, G MUN5237DW1T1, G	R1/R2	0.8 0.17 – 0.8 0.055 0.38 0.038 1.7	1.0 0.21 – 1.0 0.1 0.47 0.047 2.1	1.2 0.25 – 1.2 0.185 0.56 0.056 2.6	

5. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%

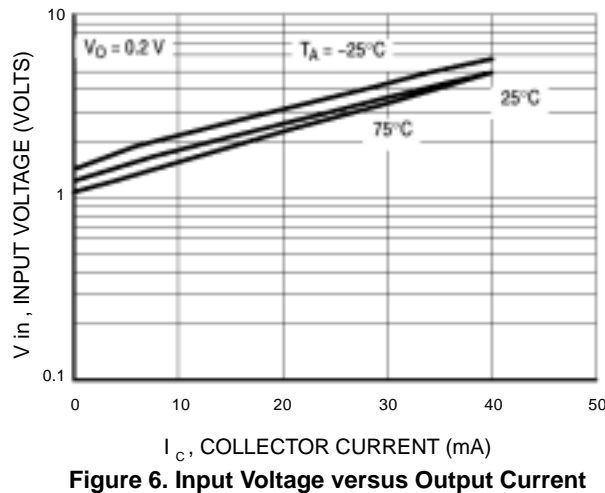
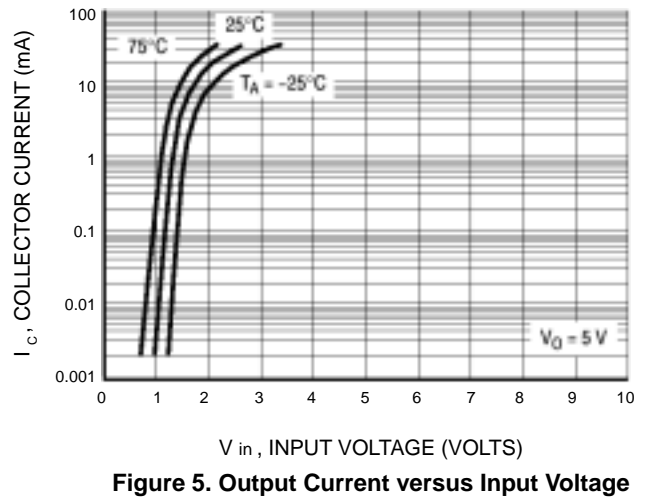
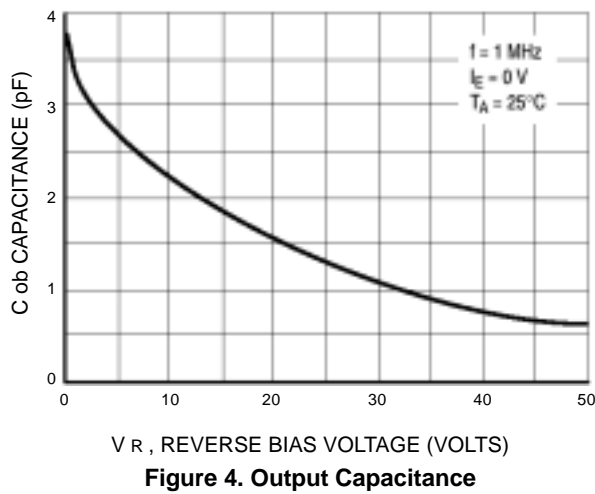
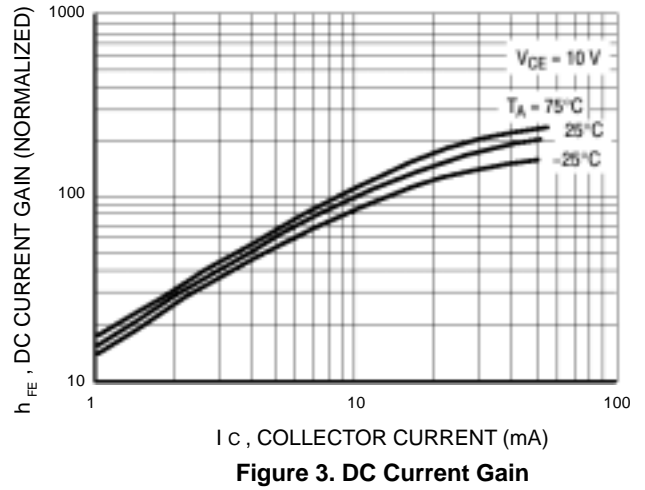
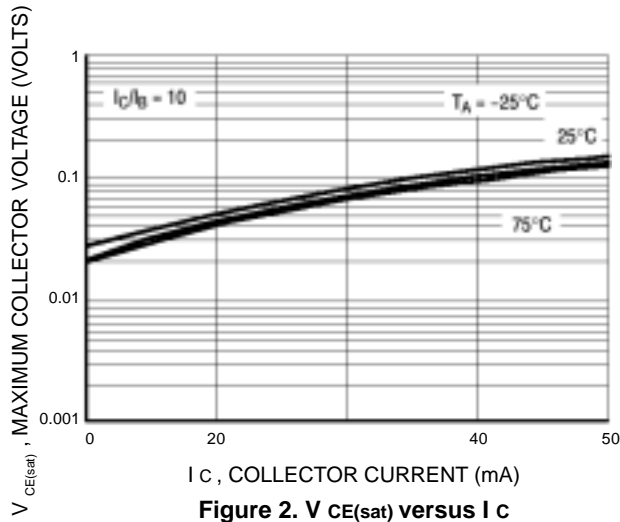
**ALL MUN5211DW1T1 SERIES DEVICES**



**Figure 1. Derating Curve**

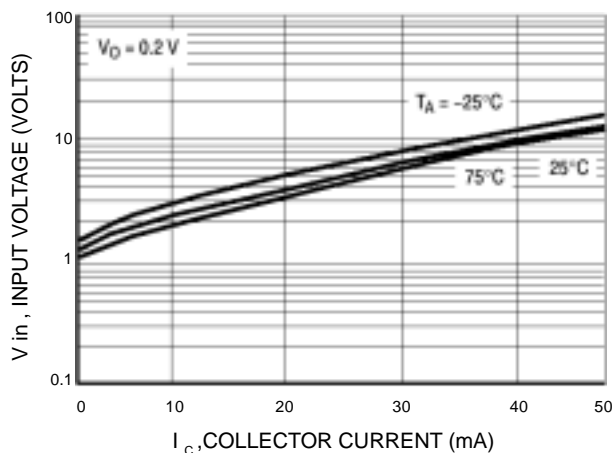
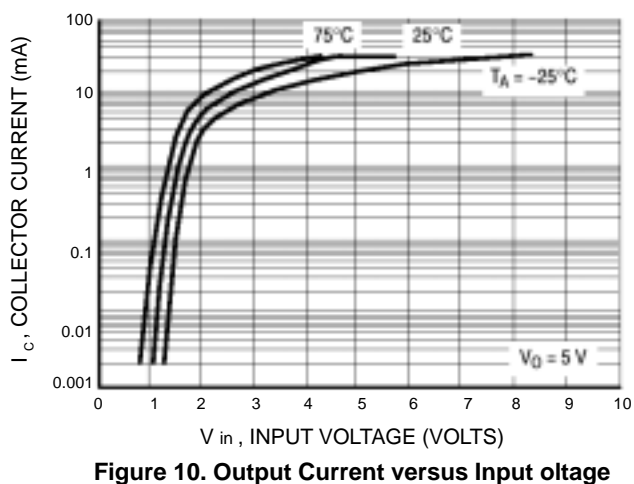
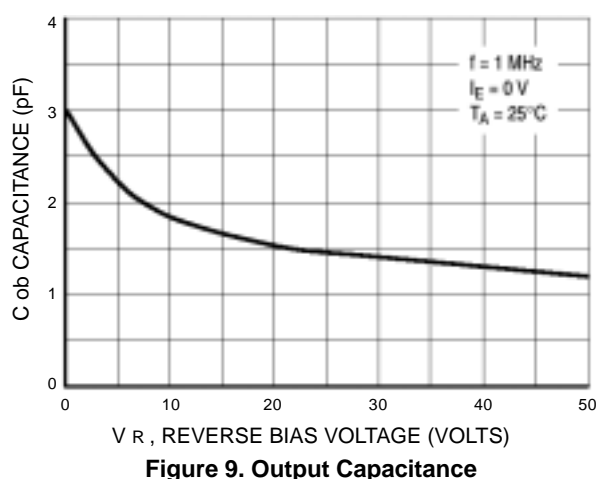
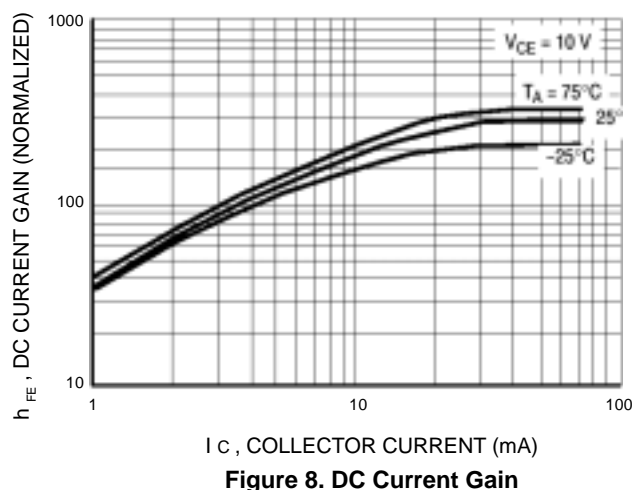
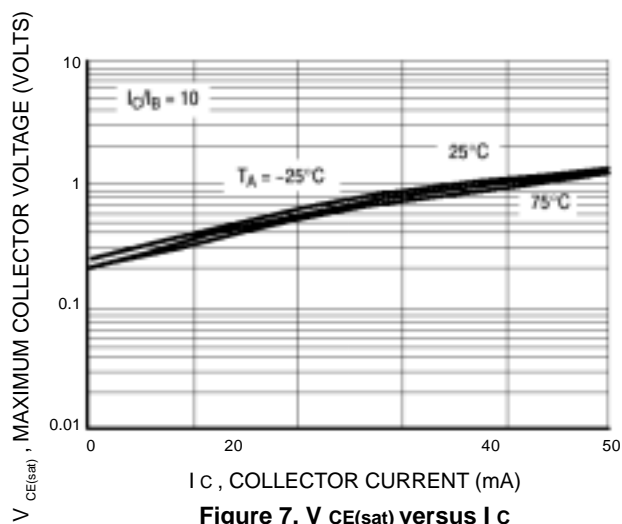
LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5211DW1T1



LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5212DW1T1



LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5213DW1T1

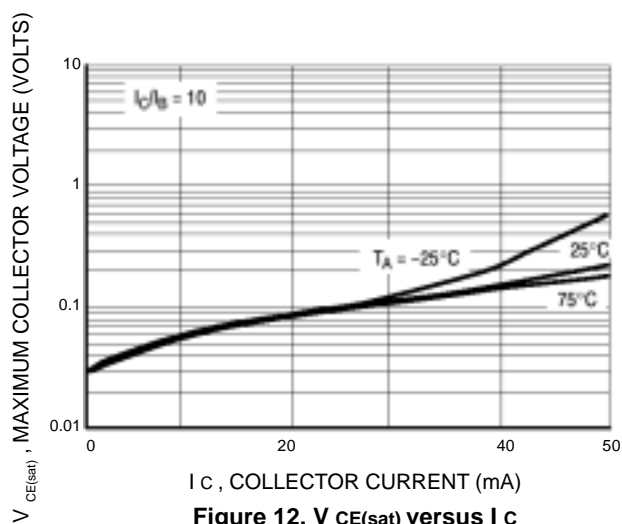


Figure 12.  $V_{CE(sat)}$  versus  $I_c$

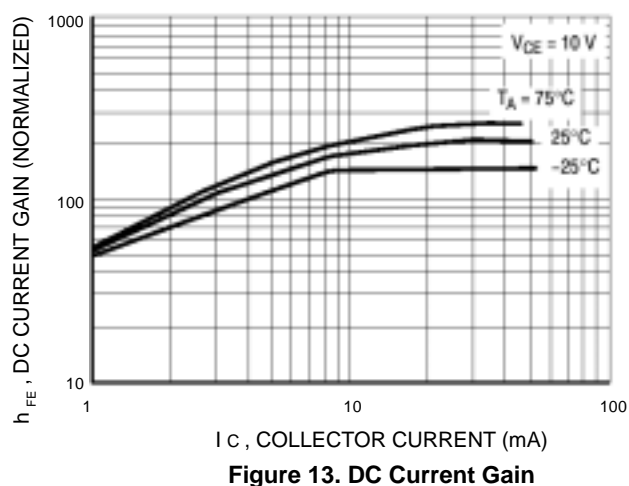


Figure 13. DC Current Gain

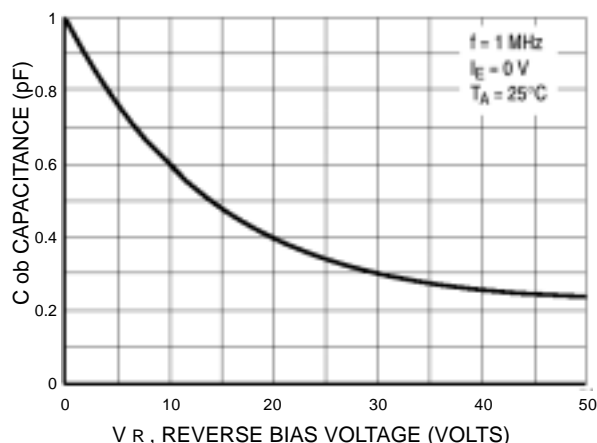


Figure 14. Output Capacitance

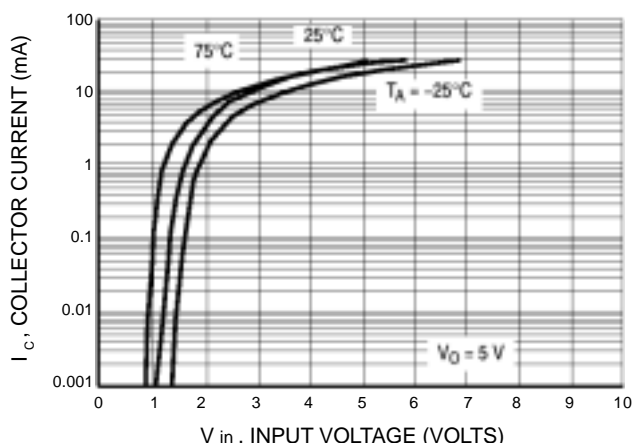


Figure 15. Output Current versus Input Voltage

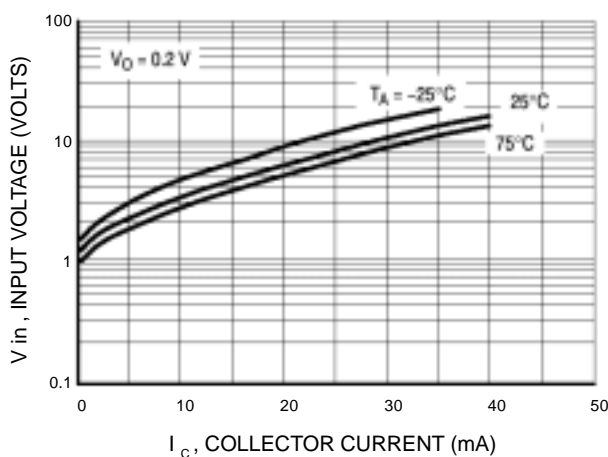
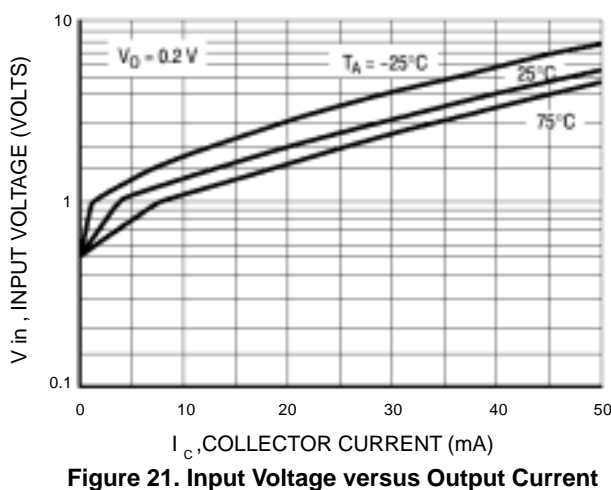
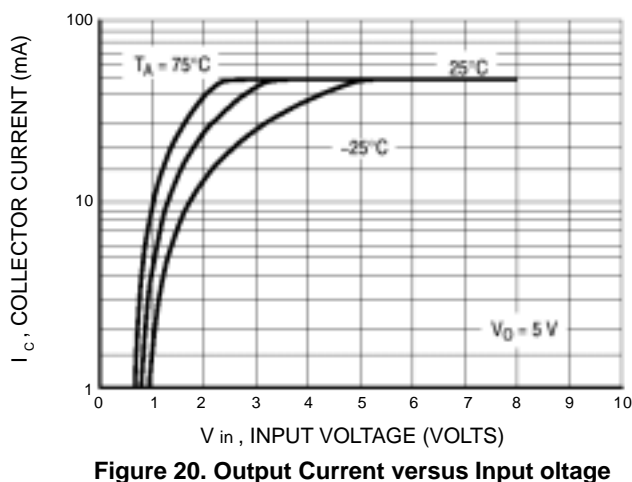
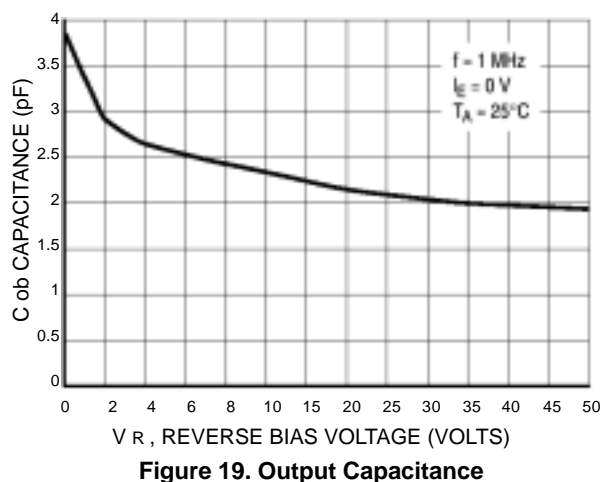
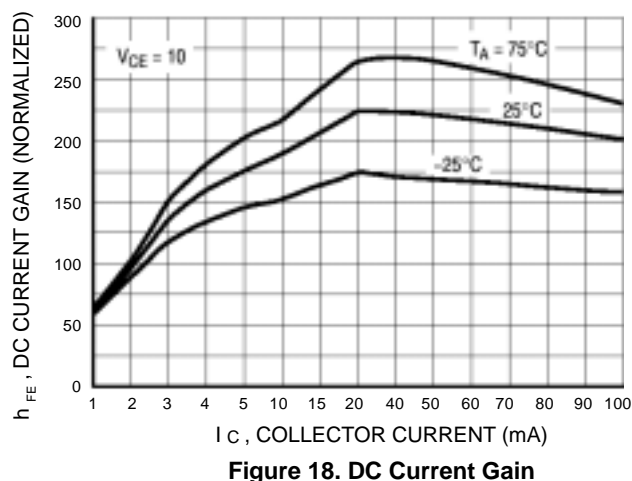
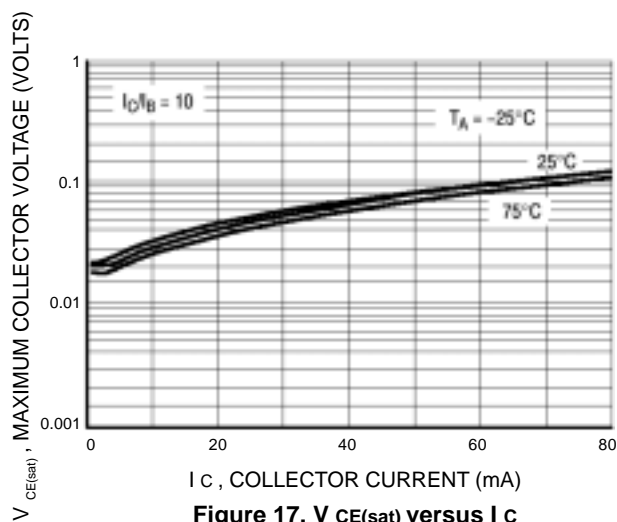


Figure 16. Input Voltage versus Output Current



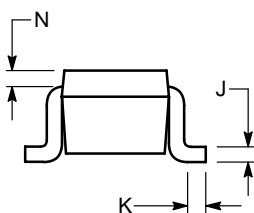
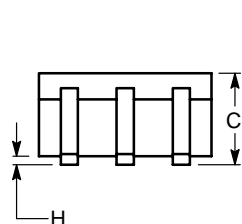
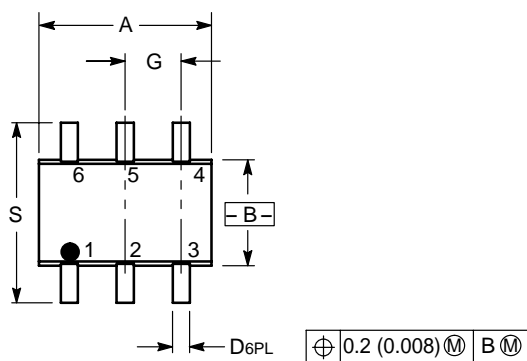
LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5214DW1T1



LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

SC-88/SOT-363

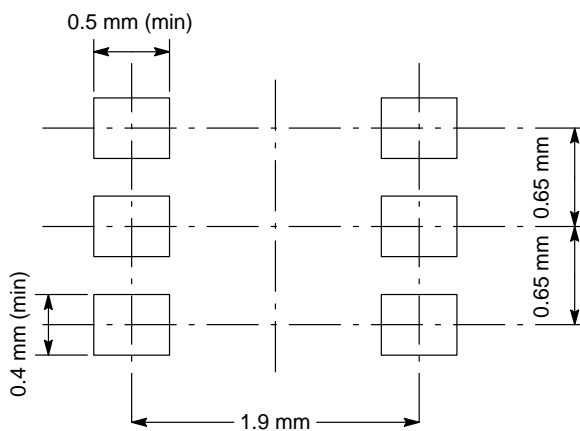


NOTES:

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



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[DTC144VUAT106](#) [MUN5241T1G](#) [BCR158WH6327XTSA1](#) [NSBA114TDP6T5G](#) [SMUN5330DW1T1G](#) [SSVMUN5312DW1T2G](#)  
[RN1303\(TE85L,F\)](#) [RN1306\(TE85L,F\)](#) [EMH15T2R](#) [SMUN2214T3G](#) [SMUN5335DW1T1G](#) [NSBC143ZPDP6T5G](#) [NSVDTA143ZET1G](#)  
[SMUN2214T1G](#) [FMA7AT148](#) [DTC114EUA-TP](#) [SMUN5237DW1T1G](#) [SMUN5213DW1T1G](#) [SMUN5114DW1T1G](#) [SMUN2111T1G](#)  
[DTC124ECA-TP](#) [DTA114ECA-TP](#) [DTC113EM3T5G](#) [NSVMUN5135DW1T1G](#) [NSVMUN2237T1G](#) [NSVDTC143ZM3T5G](#)  
[SMUN5335DW1T2G](#) [SMUN5216DW1T1G](#) [NSVMUN5316DW1T1G](#) [NSVMUN5215DW1T1G](#) [NSVMUN5213DW1T3G](#)  
[NSVMUN2112T1G](#) [NSVIMD10AMT1G](#) [NSVEMC2DXV5T1G](#) [NSVDTC144WET1G](#) [NSVDTC123JET1G](#) [NSVDTA143EM3T5G](#)  
[NSVB1706DMW5T1G](#) [NSBC143EDP6T5G](#) [RN2101,LF\(CT](#) [NSBA144WDXV6T1G](#) [DTA115TET1G](#) [NSBC115TDP6T5G](#)