

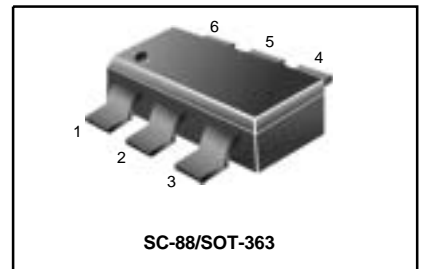
Dual Bias Resistor Transistors

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.

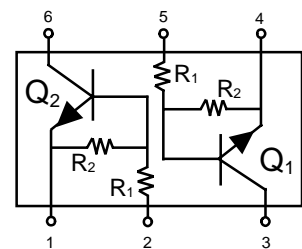
- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

LMUN5211DW1T1G
Series
S-LMUN5211DW1T1G
Series



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

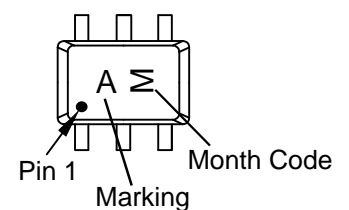
Rating	Symbol	Value	Unit
Collector-Base Voltage	V _{CBO}	50	Vdc
Collector-Emitter Voltage	V _{CEO}	50	Vdc
Emitter-Base Breakdown Voltage	V _{EBO}	6	Vdc
Collector Current	I _C	100	mAdc



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



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 Q₁ and Q₂)

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 ($V_{EB} = 6.0\text{ V}, I_C = 0$)	I_{EBO}	–	–	0.5	mAdc
LMUN5211DW1T1G		–	–	0.2	
LMUN5212DW1T1G		–	–	0.1	
LMUN5213DW1T1G		–	–	0.2	
LMUN5214DW1T1G		–	–	0.9	
LMUN5215DW1T1G		–	–	1.9	
LMUN5216DW1T1G		–	–	4.3	
LMUN5230DW1T1G		–	–	2.3	
LMUN5231DW1T1G		–	–	1.5	
LMUN5232DW1T1G		–	–	0.18	
LMUN5233DW1T1G		–	–	0.13	
LMUN5234DW1T1G		–	–	0.2	
LMUN5235DW1T1G		–	–	0.05	
LMUN5236DW1T1G		–	–	0.13	
LMUN5237DW1T1G		–	–		
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 μs , 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	–	
LMUN5211DW1T1G			60	100	–	
LMUN5212DW1T1G			80	140	–	
LMUN5213DW1T1G			80	140	–	
LMUN5214DW1T1G			160	350	–	
LMUN5215DW1T1G			160	350	–	
LMUN5230DW1T1G			3.0	5.0	–	
LMUN5231DW1T1G			8.0	15	–	
LMUN5232DW1T1G			15	30	–	
LMUN5233DW1T1G			80	200	–	
LMUN5234DW1T1G			80	150	–	
LMUN5235DW1T1G			80	140	–	
LMUN5236DW1T1G			80	150	–	
LMUN5237DW1T1G			80	140	–	

LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

ELECTRICAL CHARACTERISTICS

Collector-Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 0.3\text{ mA}$) ($I_C = 10\text{ mA}$, $I_B = 5\text{ mA}$) ($I_C = 10\text{ mA}$, $I_B = 1\text{ mA}$)	LMUN5211DW1T1G	$V_{CE(sat)}$	-	-	0.25	Vdc
	LMUN5212DW1T1G		-	-	0.25	
	LMUN5213DW1T1G		-	-	0.25	
	LMUN5214DW1T1G		-	-	0.25	
	LMUN5236DW1T1G		-	-	0.25	
	LMUN5230DW1T1G		-	-	0.25	
	LMUN5231DW1T1G		-	-	0.25	
	LMUN5237DW1T1G		-	-	0.25	
	LMUN5215DW1T1G		-	-	0.25	
	LMUN5216DW1T1G		-	-	0.25	
	LMUN5232DW1T1G		-	-	0.25	
	LMUN5233DW1T1G		-	-	0.25	
	LMUN5234DW1T1G		-	-	0.25	
	LMUN5235DW1T1G		-	-	0.25	
Output Voltage (on) ($V_{CC} = 5.0\text{ V}$, $V_B = 2.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 3.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 5.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$) ($V_{CC} = 5.0\text{ V}$, $V_B = 4.0\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	LMUN5211DW1T1G	V_{OL}	-	-	0.2	Vdc
	LMUN5212DW1T1G		-	-	0.2	
	LMUN5214DW1T1G		-	-	0.2	
	LMUN5215DW1T1G		-	-	0.2	
	LMUN5216DW1T1G		-	-	0.2	
	LMUN5230DW1T1G		-	-	0.2	
	LMUN5231DW1T1G		-	-	0.2	
	LMUN5232DW1T1G		-	-	0.2	
	LMUN5233DW1T1G		-	-	0.2	
	LMUN5234DW1T1G		-	-	0.2	
	LMUN5235DW1T1G		-	-	0.2	
	LMUN5213DW1T1G		-	-	0.2	
	LMUN5236DW1T1G		-	-	0.2	
	LMUN5237DW1T1G		-	-	0.2	

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

LMUN5211DW1T1G Series,S-LMUN5211DW1T1G 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) (Continued)						
Output Voltage (off) ($V_{CC} = 5.0\text{ V}$, $V_B = 0.5\text{ V}$, $R_L = 1.0\text{ k}\Omega$)	V _{OH}	4.9	–	–	V _{dc}	
LMUN5211DW1T1G		4.9	–	–		
LMUN5212DW1T1G		4.9	–	–		
LMUN5213DW1T1G		4.9	–	–		
LMUN5214DW1T1G		4.9	–	–		
LMUN5233DW1T1G		4.9	–	–		
LMUN5234DW1T1G		4.9	–	–		
LMUN5235DW1T1G		4.9	–	–		
($V_{CC} = 5.0\text{ V}$, $V_B = 0.050\text{ V}$, $R_L = 1.0\text{ k}\Omega$)		LMUN5230DW1T1G	4.9	–		–
($V_{CC} = 5.0\text{ V}$, $V_B = 0.25\text{ V}$, $R_L = 1.0\text{ k}\Omega$)		LMUN5215DW1T1G	4.9	–		–
		LMUN5216DW1T1G	4.9	–		–
		LMUN5231DW1T1G	4.9	–		–
		LMUN5232DW1T1G	4.9	–		–
		LMUN5236DW1T1G	4.9	–		–
		LMUN5237DW1T1G	4.9	–		–
Input Resistor	R1	7.0	10	13	k Ω	
LMUN5211DW1T1G		15.4	22	28.6		
LMUN5212DW1T1G		32.9	47	61.1		
LMUN5213DW1T1G		7.0	10	13		
LMUN5214DW1T1G		7.0	10	13		
LMUN5215DW1T1G		3.3	4.7	6.1		
LMUN5216DW1T1G		0.7	1.0	1.3		
LMUN5230DW1T1G		1.5	2.2	2.9		
LMUN5231DW1T1G		3.3	4.7	6.1		
LMUN5232DW1T1G		3.3	4.7	6.1		
LMUN5233DW1T1G		15.4	22	28.6		
LMUN5234DW1T1G		1.54	2.2	2.86		
LMUN5235DW1T1G		70	100	130		
LMUN5236DW1T1G		32.9	47	61.1		
LMUN5237DW1T1G						
Resistor Ratio	R1/R2	0.8	1.0	1.2		
LMUN5211DW1T1G/LMUN5212DW1T1G/LMUN5213DW1T1G/LMUN5236DW1T1G		0.17	0.21	0.25		
LMUN5214DW1T1G		–	–	–		
LMUN5215DW1T1G/LMUN5216DW1T1G		0.8	1.0	1.2		
LMUN5230DW1T1G/LMUN5231DW1T1G/LMUN5232DW1T1G		0.055	0.1	0.185		
LMUN5233DW1T1G		0.38	0.47	0.56		
LMUN5234DW1T1G/LMUN5235DW1T1G/LMUN5237DW1T1G		0.038	0.047	0.056		
	1.7	2.1	2.6			

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

ALL LMUN5211DW1T1G SERIES DEVICES

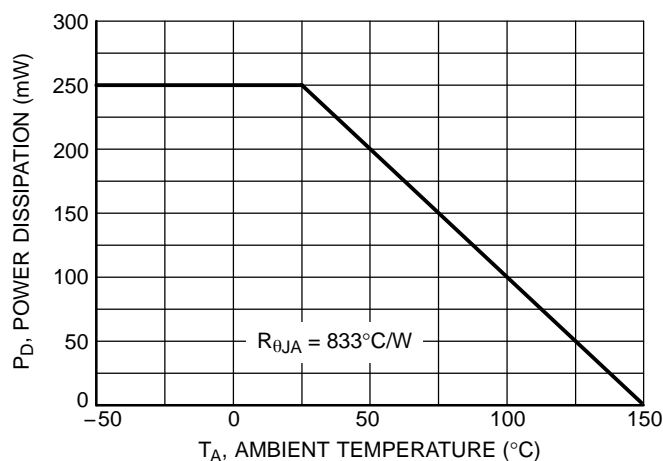
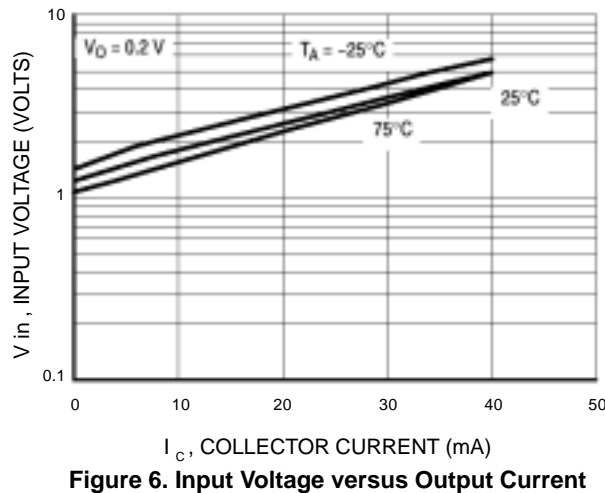
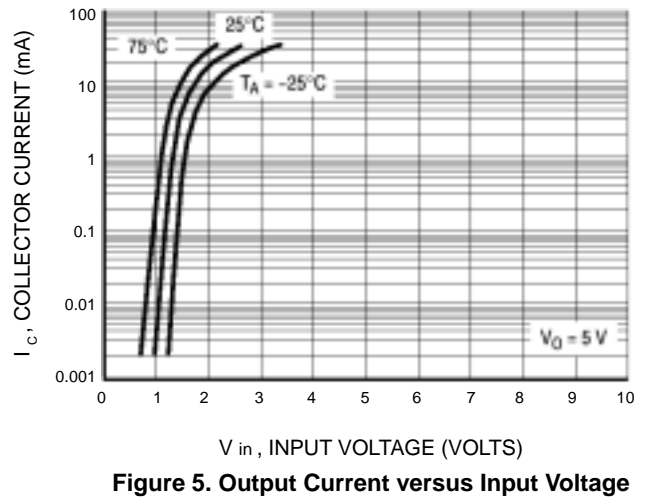
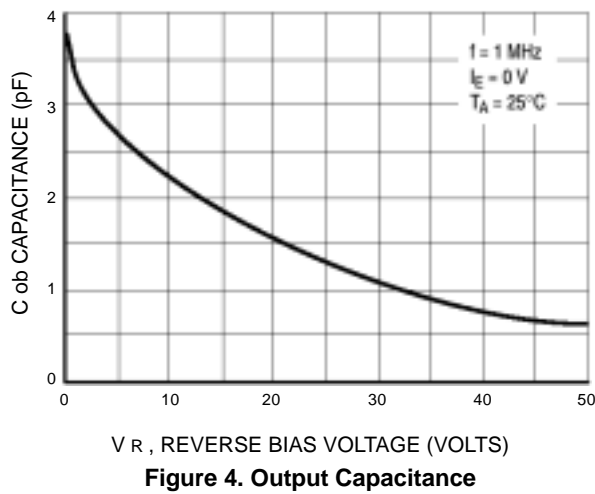
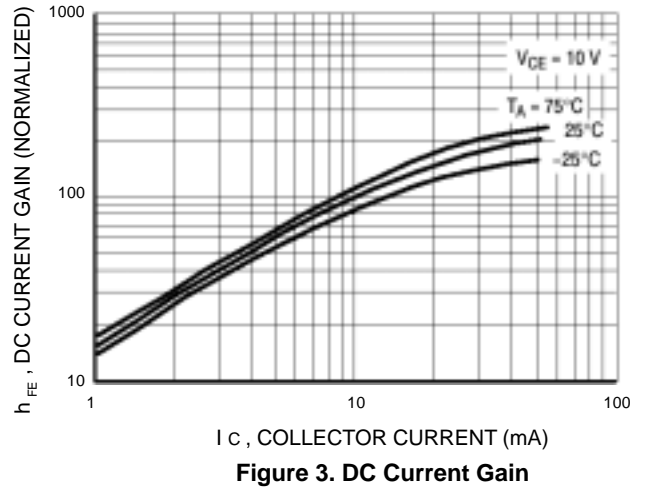
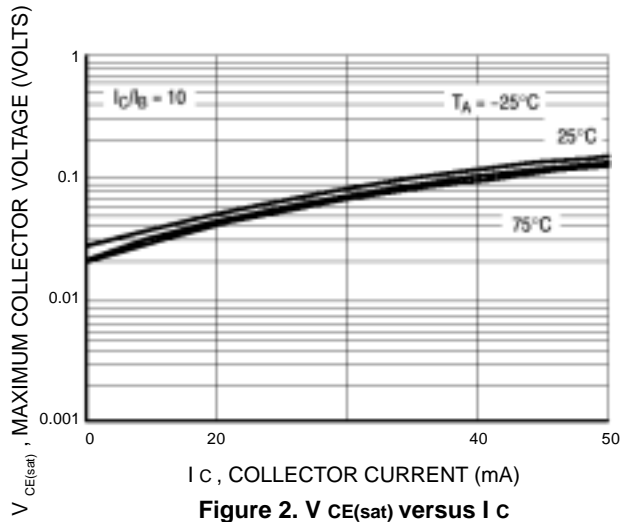


Figure 1. Derating Curve

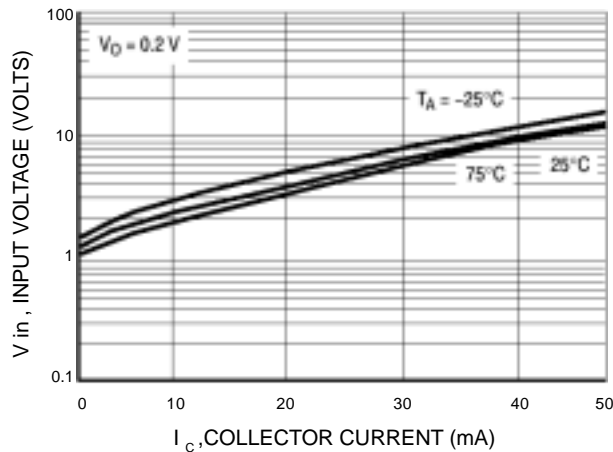
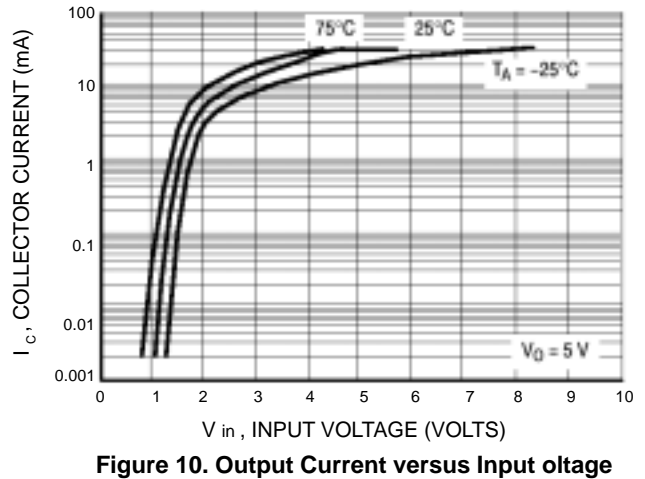
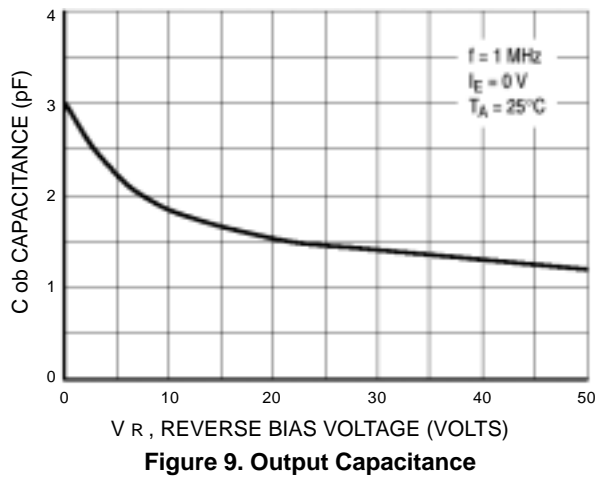
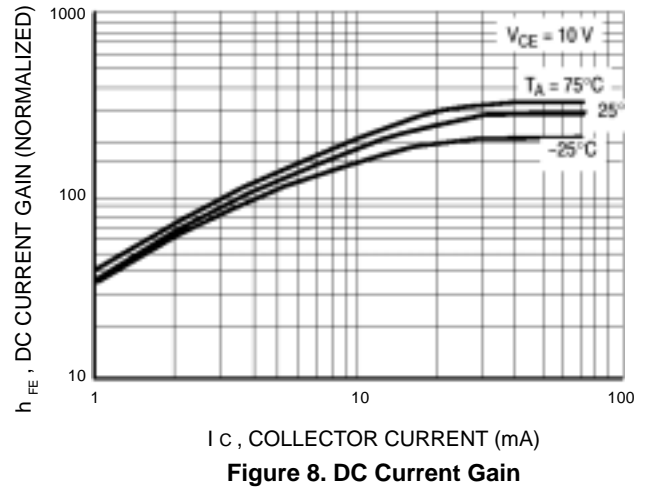
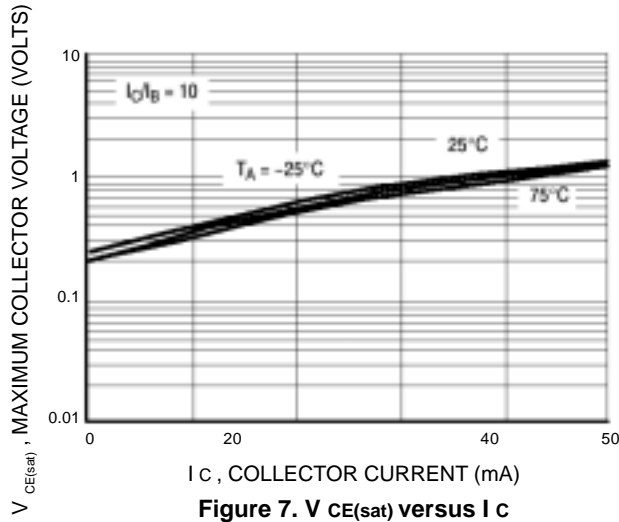
LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5211DW1T1



LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5212DW1T1



LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5213DW1T1

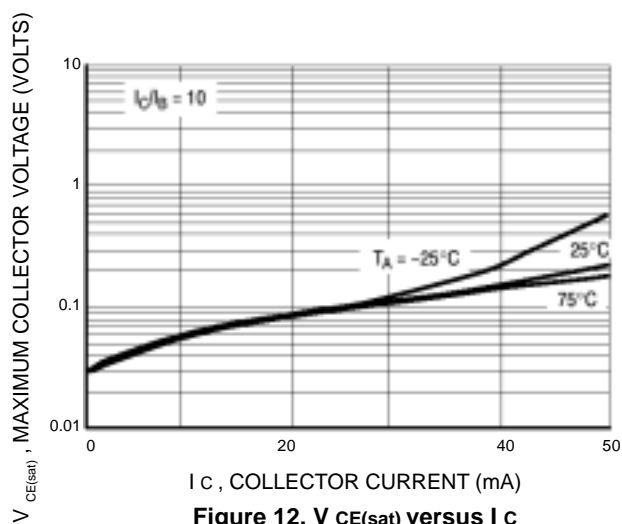


Figure 12. $V_{CE(sat)}$ versus I_c

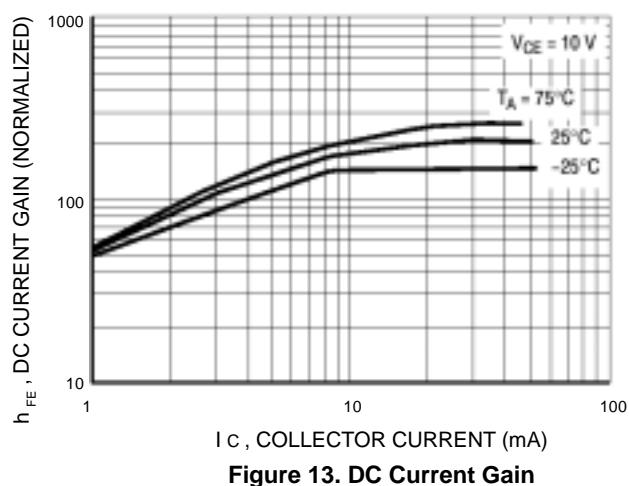


Figure 13. DC Current Gain

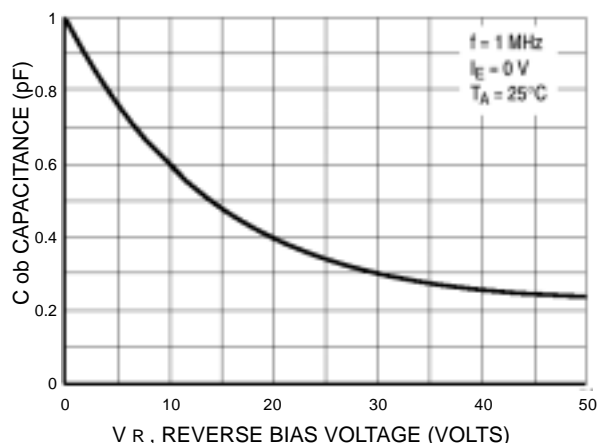


Figure 14. Output Capacitance

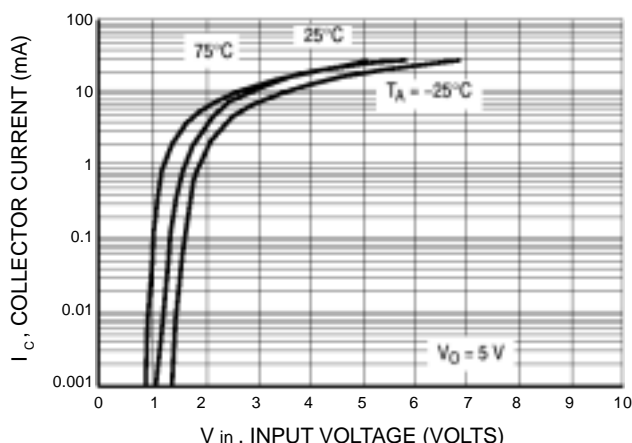


Figure 15. Output Current versus Input Voltage

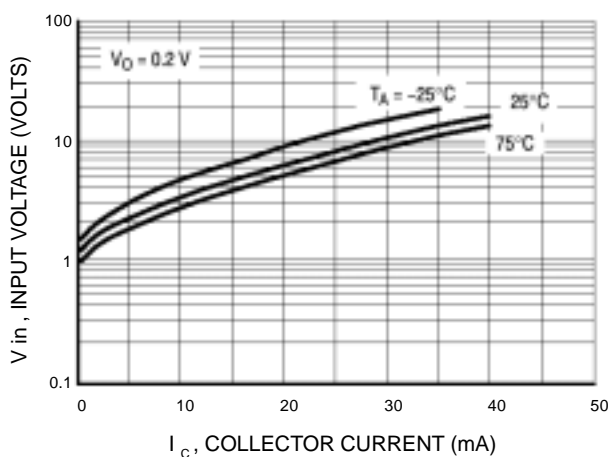


Figure 16. Input Voltage versus Output Current

LMUN5211DW1T1G Series,S-LMUN5211DW1T1G Series

TYPICAL ELECTRICAL CHARACTERISTICS – LMUN5214DW1T1

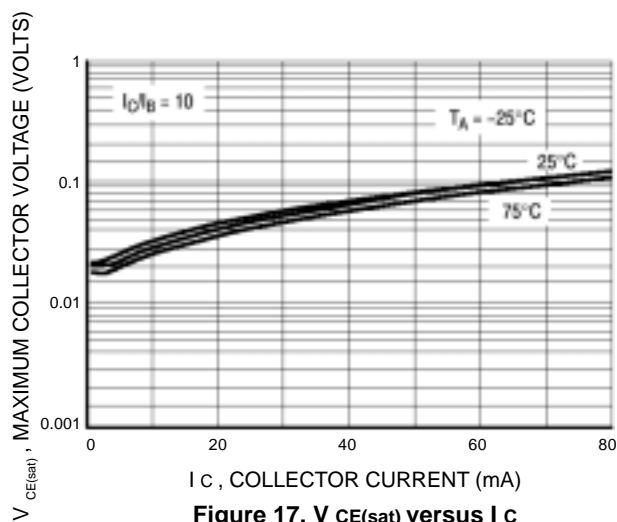


Figure 17. $V_{CE(sat)}$ versus I_C

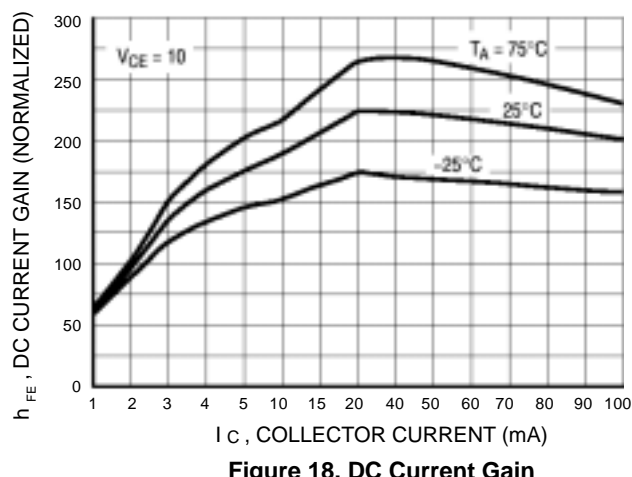


Figure 18. DC Current Gain

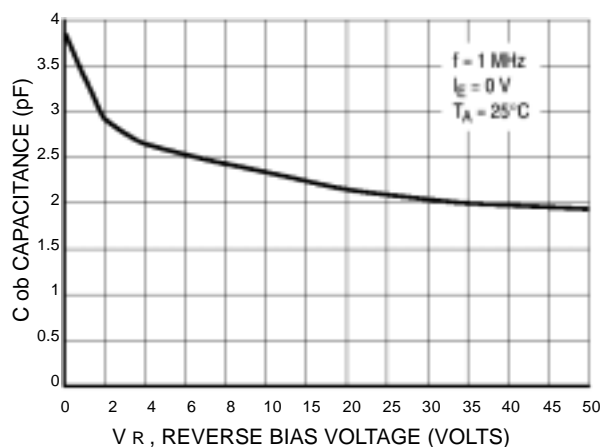


Figure 19. Output Capacitance

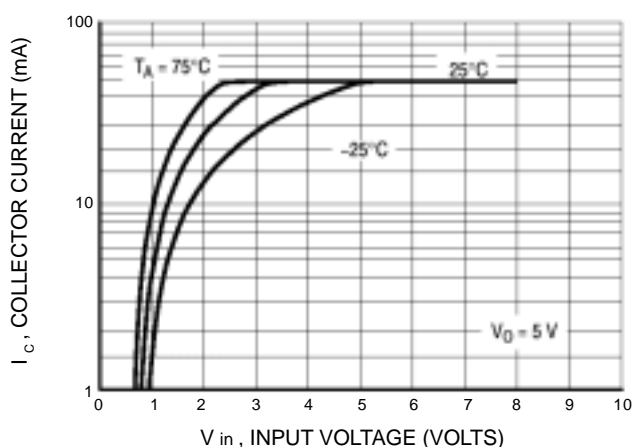


Figure 20. Output Current versus Input Voltage

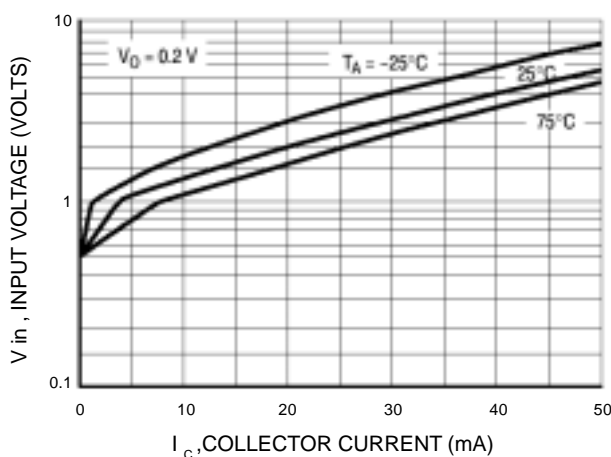
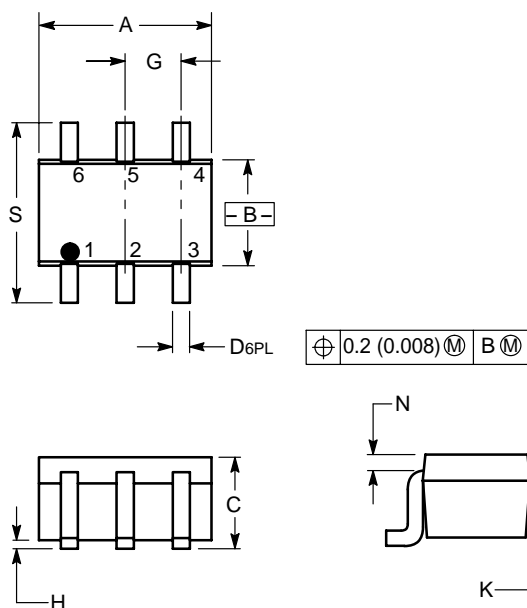


Figure 21. Input Voltage versus Output Current

LMUN5211DW1T1G Series, S-LMUN5211DW1T1G Series

SC-88/SOT-363

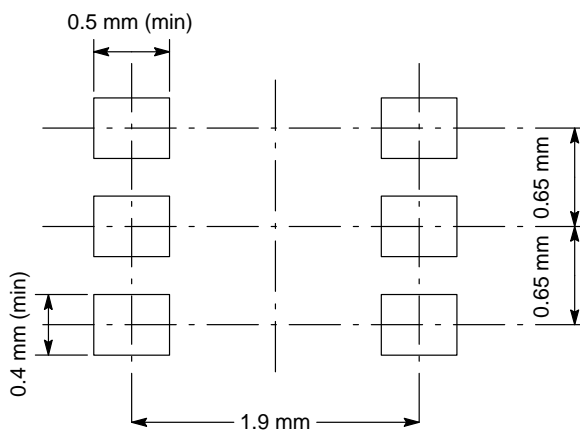


NOTES:

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



DISCLAIMER

- Curve guarantee in the specification. The curve of test items with electric parameter is used as quality guarantee. The curve of test items without electric parameter is used as reference only.
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- All information contained in this document is current as of the issuing date and subject to change without any prior notice. Before purchasing or using LRC's Products, please confirm the latest information with a LRC sales representative.