DESCRIPTION

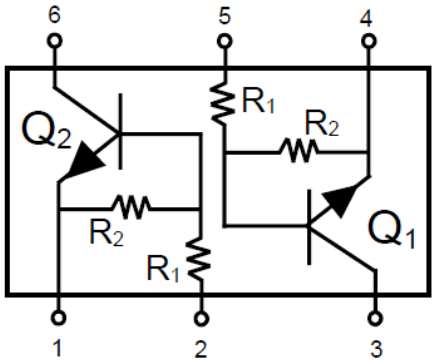
The BRT (Bias Resistor Transistor) contains a single transistor with a monolithic bias network consisting of two resistors; a series base resistor and a base–emitter resistor. These digital transistors are designed to replace a single device and its external resistor bias network. The BRT eliminates these individual components by integrating them into a single device. In the MUN52xxDW series, two BRT devices are housed in the SC-88 package which is ideal for low power surface mount applications where board space is at a premium.

The MUN5211DW~MUN5237DW is available in SC-88 package

FEATURES

- Simplifies Circuit Design
- Reduces Board Space
- Reduces Component Count
- Available in SC-88 package

PIN DESCRIPTION



ORDERING INFORMATION

Package Type	Part Number
SC-88	MUN5211DW
	MUN5212DW
	MUN5213DW
	MUN5214DW
	MUN5215DW
	MUN5216DW
	MUN5230DW
	MUN5231DW
	MUN5232DW
	MUN5233DW
	MUN5234DW
	MUN5235DW
	MUN5236DW
	MUN5237DW
Note	SQP: 3,000pcs/Reel
AiT provides all RoHS Compliant Products	

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted, common for Q_1 and Q_2

V_{CBO}, Collector-Base Voltage	50Vdc
V_{CEO}, Collector-Emitter Voltage	50Vdc
I_C, Collector Current	100mAdc

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

Parameter (One Junction Heated)	Symbol	Max.	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D	187NOTE1 256NOTE2 1.5NOTE1 2.0NOTE2	mW mW/°C
Thermal Resistance-Junction-to-Ambient	$R_{\theta JA}$	670NOTE1 490NOTE2	°C/W
Parameter (Both Junctions Heated))	**Symbol**	**Max.**	**Unit**
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D	250NOTE1 385NOTE2 2.0NOTE1 3.0NOTE2	mW mW/°C
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	493NOTE1 325NOTE2	°C/W
Thermal Resistance – Junction-to-Lead	$R_{\theta JL}$	188NOTE1 208NOTE2	°C/W
Junction and Storage Temperature	T_J, T_{STG}	-55 to +150	°C

NOTE1: FR–4 @ Minimum Pad
NOTE2: FR–4 @ 1.0 x 1.0 inch Pad

ELECTRICAL CHARACTERISTICS

T_A = 25°C unless otherwise noted, common for Q_1 and Q_2

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS							
Collector-Base Cutoff Current	I_{CBO}	V_{CB} = 50V, I_E = 0		-	-	100	nAdc
Collector-Emitter Cutoff Current	I_{CEO}	V_{CE} = 50V, I_B = 0		-	-	500	nAdc
Emitter-Base Cutoff Current	I_{EBO}	V_{EB} = 6.0V, I_C = 0	MUN5211DW	-	-	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	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0		50	-	-	Vdc
Collector-Emitter Breakdown Voltage[NOTE3]	$V_{(BR)CEO}$	I_C = 2.0mA, I_B = 0		50		-	Vdc

NOTE3: Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
ON CHARACTERISTICS[NOTE3]							
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 5.0mA	MUN5211DW	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	$V_{CE(sat)}$	I_C = 10mA, I_B = 0.3mA	MUN5211DW	-	-	0.25	Vdc
			MUN5212DW				
			MUN5213DW				
			MUN5214DW				
			MUN5235DW				
			MUN5236DW				
		I_C = 10mA, I_B = 5mA	MUN5230DW				
			MUN5231DW				
			MUN5237DW				
		I_C = 10mA, I_B = 1mA	MUN5215DW				
			MUN5216DW				
			MUN5232DW				
			MUN5233DW				
			MUN5234DW				

NOTE3: Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Output Voltage (on)	V_{OL}	V_{CC} = 5.0V, V_B = 2.5V, R_L = 1.0kΩ	MUN5211DW	-	-	0.2	Vdc
			MUN5212DW				
			MUN5214DW				
			MUN5215DW				
			MUN5216DW				
			MUN5230DW				
			MUN5231DW				
			MUN5232DW				
			MUN5233DW				
			MUN5234DW				
			MUN5235DW				
		V_{CC} = 5.0V, V_B = 3.5V, R_L = 1.0kΩ	MUN5213DW				
		V_{CC} = 5.0V, V_B = 5.5V, R_L = 1.0kΩ	MUN5236DW				
		V_{CC} = 5.0V, V_B = 4.0V, R_L = 1.0kΩ	MUN5237DW				
Output Voltage (off)	V_{OH}	V_{CC}=5.0V, V_B=0.5V, R_L=1.0kΩ	MUN5211DW	4.9	-	-	Vdc
			MUN5212DW				
			MUN5213DW				
			MUN5214DW				
			MUN5233DW				
			MUN5234DW				
			MUN5235DW				
		V_{CC} = 5.0V, V_B = 0.05V, R_L = 1.0kΩ	MUN5230DW				
		V_{CC} = 5.0V, V_B = 0.25V, R_L = 1.0kΩ	MUN5215DW				
			MUN5216DW				
			MUN5231DW				
			MUN5232DW				
			MUN5236DW				
			MUN5237DW				

NOTE3: Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

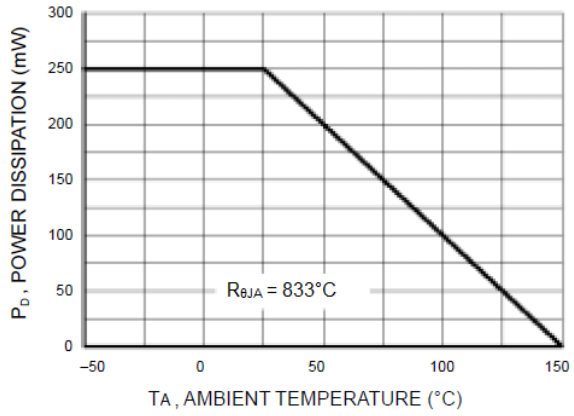
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
Input Resistor	R_1		MUN5211DW	7.0	10	13	kΩ
			MUN5212DW	15.4	22	28.6	
			MUN5213DW	32.9	47	61.1	
			MUN5214DW	7.0	10	13	
			MUN5215DW	7.0	10	13	
			MUN5216DW	3.3	4.7	6.1	
			MUN5230DW	0.7	1.0	1.3	
			MUN5231DW	1.5	2.2	2.9	
			MUN5232DW	3.3	4.7	6.1	
			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	R_1 /R_2		MUN5211DW	0.8	1.0	1.2	
			MUN5212DW				
			MUN5213DW				
			MUN5236DW				
			MUN5214DW	0.17	0.21	0.25	
			MUN5215DW	-	-	-	
			MUN5216DW				
			MUN5230DW	0.8	1.0	1.2	
			MUN5231DW				
			MUN5232DW				
			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	

NOTE3: Pulse Test: Pulse Width < 300μs, Duty Cycle < 2.0%

TYPICAL CHARACTERISTICS

ALL MUN52xxDW SERIES DEVICES

Figure 1. Derating Curve



MUN5211DW

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

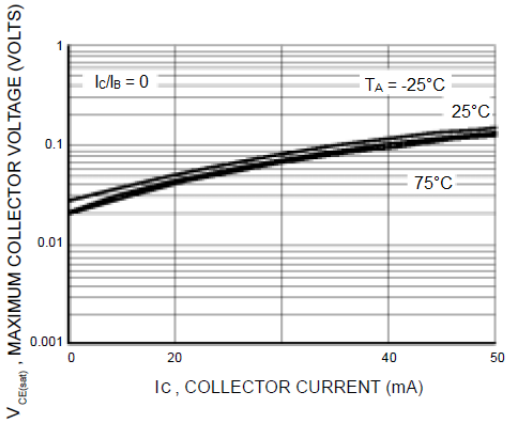


Figure 3. DC Current Gain

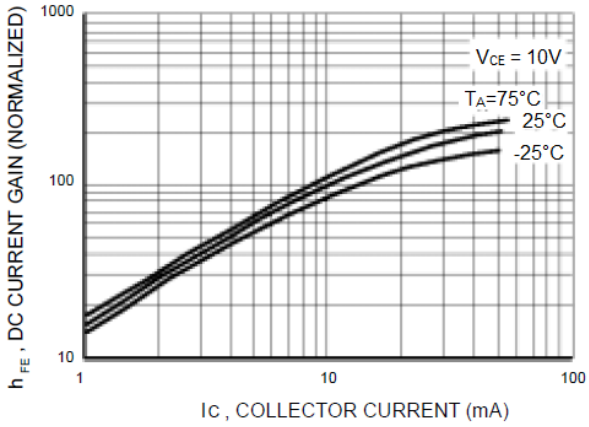


Figure 4. Output Capacitance

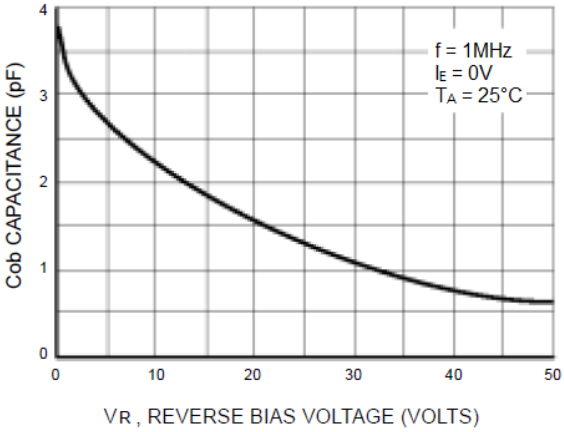


Figure 5. Output Current vs. Input Voltage

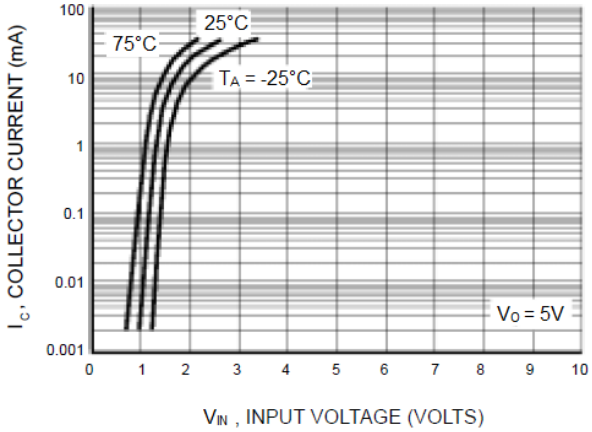
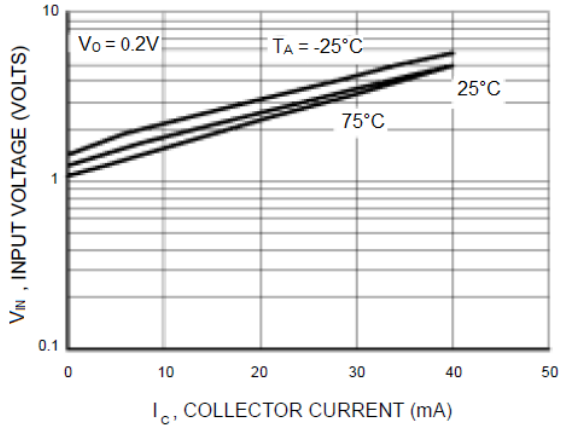


Figure 6. Input Voltage vs. Output Current



MUN5212DW

Figure 7. $V_{CE(sat)}$ vs. I_C

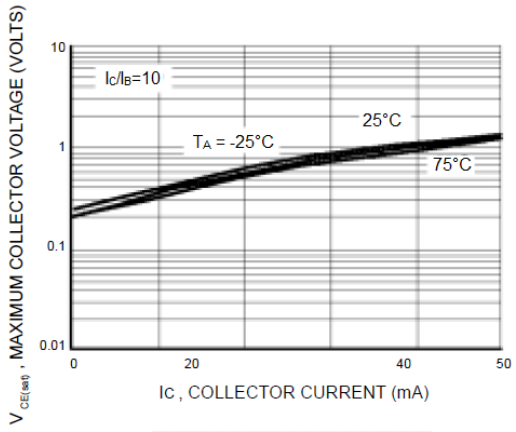


Figure 8. DC Current Gain

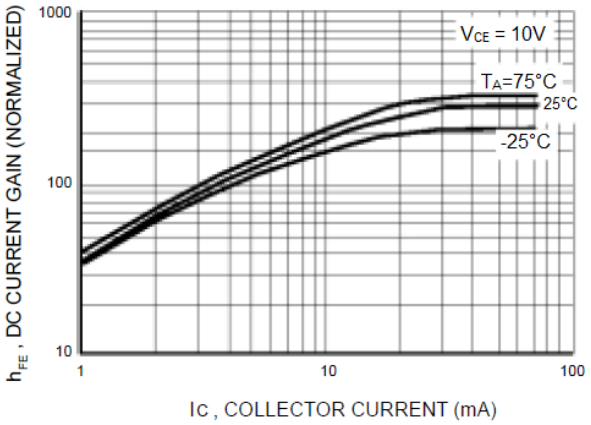


Figure 9. Output Capacitance

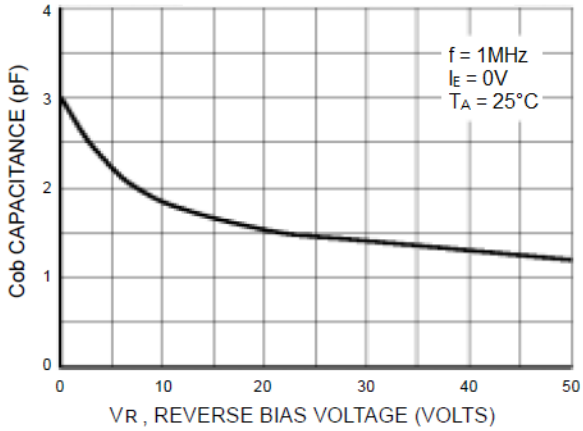


Figure 10. Output Current vs. Input Voltage

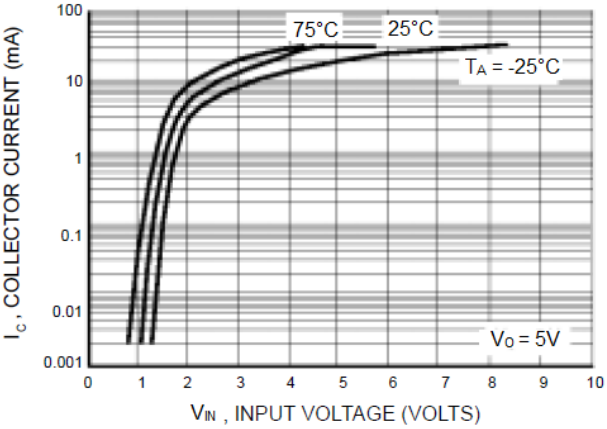
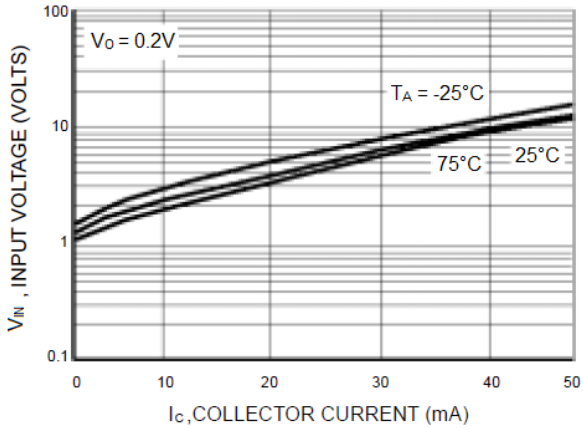


Figure 11. Input Voltage vs. Output Current



MUN5213DW

Figure 12. $V_{CE(sat)}$ vs. I_C

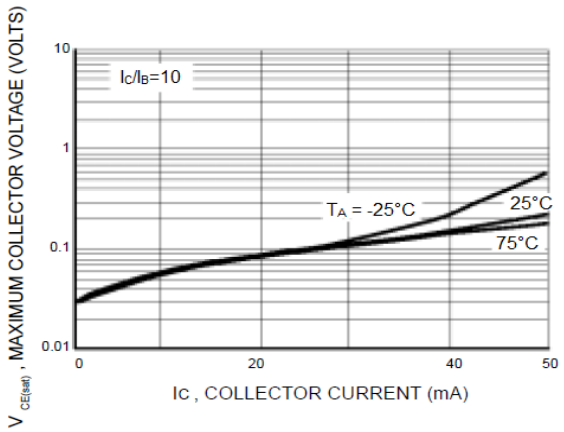


Figure 13. DC Current Gain

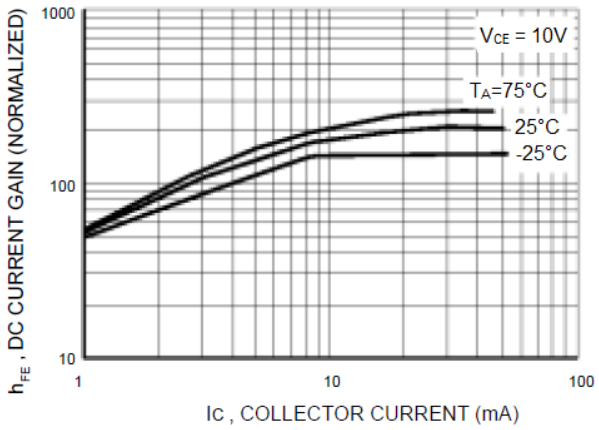


Figure 14. Output Capacitance

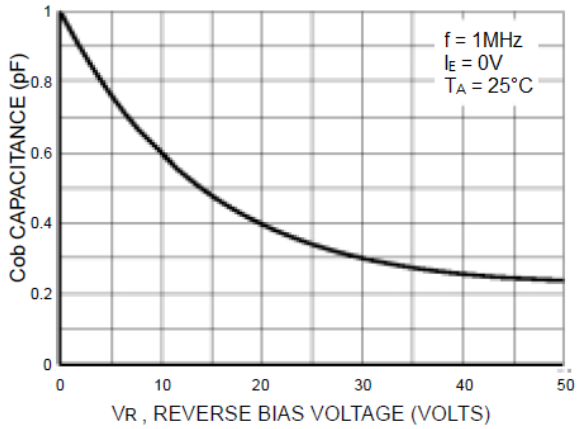


Figure 15. Output Current vs. Input Voltage

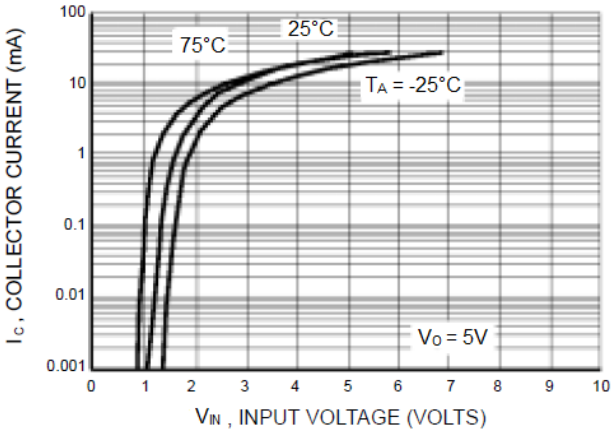
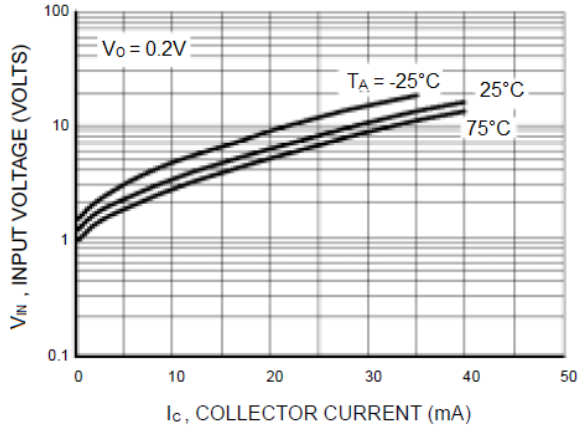


Figure 16. Input Voltage vs. Output Current



MUN5214DW

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

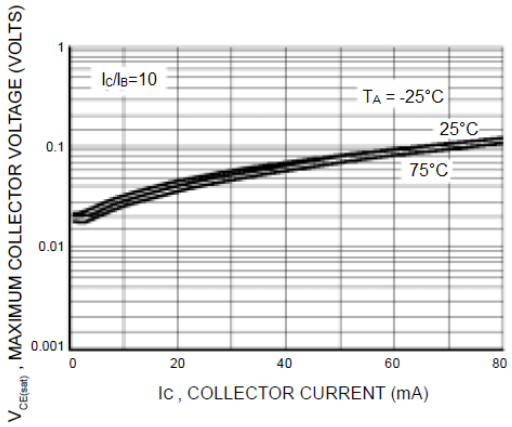


Figure 18. DC Current Gain

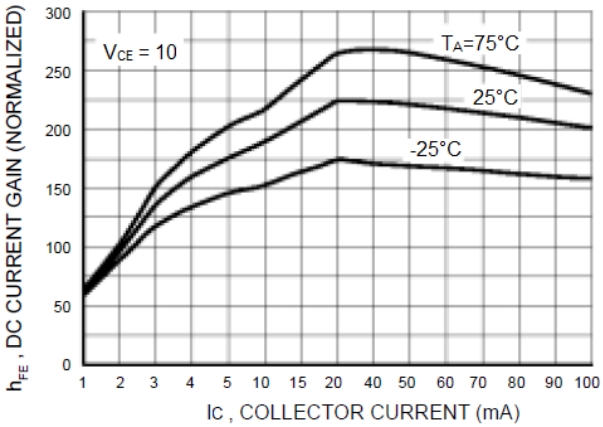


Figure 19. Output Capacitance

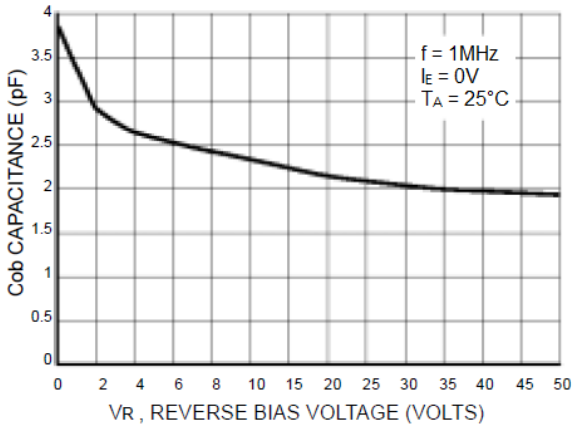


Figure 20. Output Current vs. Input Voltage

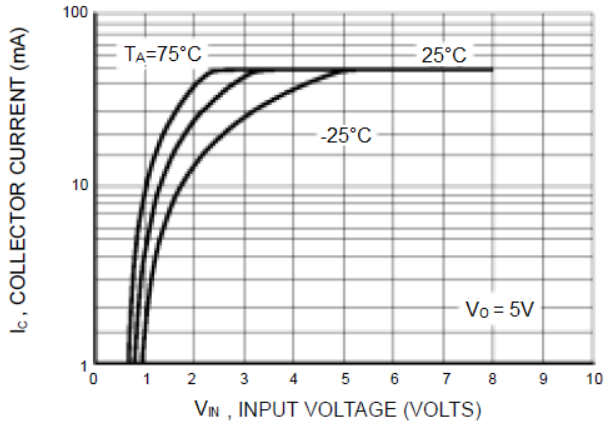
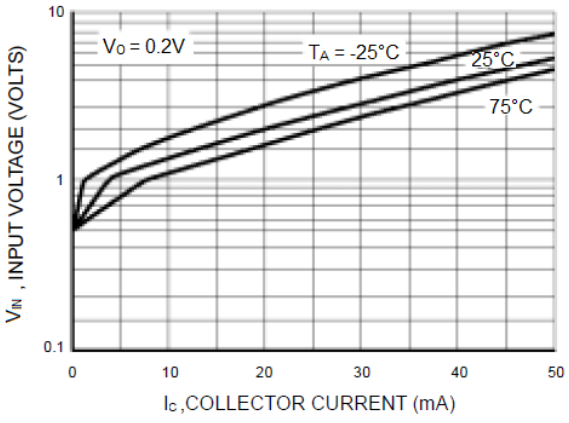
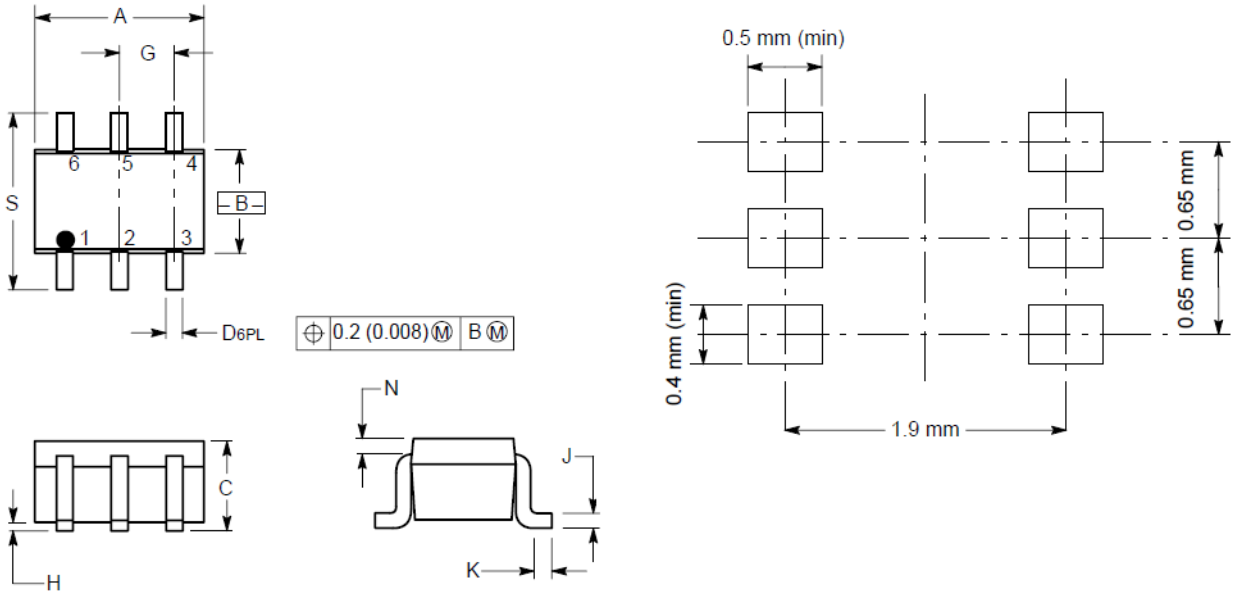


Figure 21 Input Voltage vs. Output Current



PACKAGE INFORMATION

Dimension in SC-88 (Unit: mm)



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

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