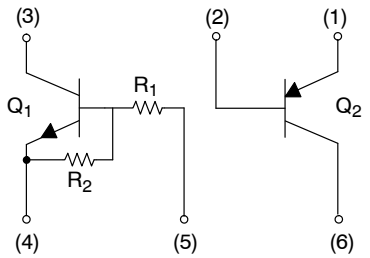
# Dual Transistor - Power Management

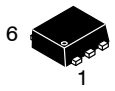
## NPN/PNP Dual (Complementary)

# EMF18XV6T5




### Features

- Low $V_{CE(SAT)}$, $< 0.5$ V
- These are Pb−Free Devices




**SOT−563**
**CASE 463A**
**PLASTIC**

### MAXIMUM RATINGS

**Q1**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 50 | Vdc |
| Collector-Emitter Voltage | $V_{CEO}$ | 50 | Vdc |
| Collector Current | $I_C$ | 100 | mAdc |

**Q2**

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector − Emitter Voltage | $V_{CEO}$ | −60 | V |
| Collector − Base Voltage | $V_{CBO}$ | −50 | V |
| Emitter − Base Voltage | $V_{EBO}$ | −6.0 | V |
| Collector Current − Continuous | $I_C$ | −100 | mAdc |

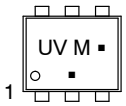
### THERMAL CHARACTERISTICS

| Characteristic (One Junction Heated) | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 357 (Note 1)<br>2.9 (Note 1) | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 350 (Note 1) | °C/W |
| **Characteristic (Both Junctions Heated)** | **Symbol** | **Max** | **Unit** |
| Total Device Dissipation $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 500 (Note1)<br>4.0 (Note 1) | mW<br>mW/°C |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 250 (Note 1) | °C/W |
| Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | −55 to +150 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR−4 @ Minimum Pad.

### MARKING DIAGRAM




UV = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| EMF18XV6T5G | SOT−563 (Pb−Free) | 8000/Tape & Reel |
| EMF18XV6T1G | SOT−563 (Pb−Free) | 4000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C) (Note 2)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **Q1: NPN** | | | | | |
| Collector-Base Cutoff Current ($V_{CB}$ = 50 V, $I_E$ = 0) | $I_{CBO}$ | – | – | 100 | nAdc |
| Collector-Emitter Cutoff Current ($V_{CE}$ = 50 V, $I_B$ = 0) | $I_{CEO}$ | – | – | 500 | nAdc |
| Emitter-Base Cutoff Current ($V_{EB}$ = 6.0 V, $I_C$ = 0) | $I_{EBO}$ | – | – | 0.1 | mAdc |
| Collector-Base Breakdown Voltage ($I_C$ = 10 μA, $I_E$ = 0) | $V_{(BR)CBO}$ | 50 | – | – | Vdc |
| Collector-Emitter Breakdown Voltage (Note 4) ($I_C$ = 2.0 mA, $I_B$ = 0) | $V_{(BR)CEO}$ | 50 | – | – | Vdc |
| DC Current Gain ($V_{CE}$ = 10 V, $I_C$ = 5.0 mA) | $h_{FE}$ | 80 | 140 | – | |
| Collector-Emitter Saturation Voltage ($I_C$ = 10 mA, $I_B$ = 0.3 mA) | $V_{CE(sat)}$ | – | – | 0.25 | Vdc |
| Output Voltage (on) ($V_{CC}$ = 5.0 V, $V_B$ = 3.5 V, $R_L$ = 1.0 kΩ) | $V_{OL}$ | – | – | 0.2 | Vdc |
| Output Voltage (off) ($V_{CC}$ = 5.0 V, $V_B$ = 0.5 V, $R_L$ = 1.0 kΩ) | $V_{OH}$ | 4.9 | – | – | Vdc |
| Input Resistor | R1 | 32.9 | 47 | 61.1 | kΩ |
| Resistor Ratio | R1/R2 | 0.8 | 1.0 | 1.2 | |
| **Q2: PNP** | | | | | |
| Collector−Base Breakdown Voltage ($I_C$ = −50 μAdc, $I_E$ = 0) | $V_{(BR)CBO}$ | −60 | – | – | Vdc |
| Collector−Emitter Breakdown Voltage ($I_C$ = −1.0 mAdc, $I_B$ = 0) | $V_{(BR)CEO}$ | −50 | – | – | Vdc |
| Emitter−Base Breakdown Voltage ($I_E$ = −50 μAdc, $I_E$ = 0) | $V_{(BR)EBO}$ | −6.0 | – | – | Vdc |
| Collector−Base Cutoff Current ($V_{CB}$ = −30 Vdc, $I_E$ = 0) | $I_{CBO}$ | – | – | −0.5 | nA |
| Emitter−Base Cutoff Current ($V_{EB}$ = −5.0 Vdc, $I_B$ = 0) | $I_{EBO}$ | – | – | −0.5 | μA |
| Collector−Emitter Saturation Voltage (Note 4) ($I_C$ = −50 mAdc, $I_B$ = −5.0 mAdc) | $V_{CE(sat)}$ | – | – | −0.5 | Vdc |
| DC Current Gain (Note 4) ($V_{CE}$ = −6.0 Vdc, $I_C$ = −1.0 mAdc) | $h_{FE}$ | 120 | – | 560 | – |
| Transition Frequency ($V_{CE}$ = −12 Vdc, $I_C$ = −2.0 mAdc, f = 30 MHz) | $f_T$ | – | 140 | – | MHz |
| Output Capacitance ($V_{CB}$ = −12 Vdc, $I_E$ = 0 Adc, f = 1.0 MHz) | $C_{OB}$ | – | 3.5 | – | pF |

3. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.
4. Pulse Test: Pulse Width ≤ 300 μs, D.C. ≤ 2%.

## TYPICAL ELECTRICAL CHARACTERISTICS — Q1, NPN

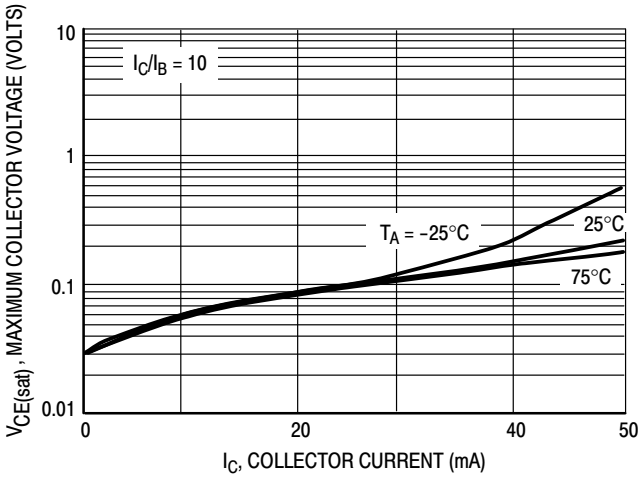



**Figure 1. $V_{CE(sat)}$ versus $I_C$**

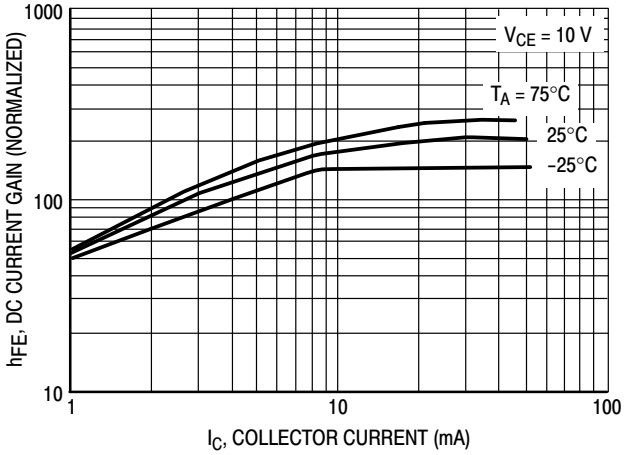



**Figure 2. DC Current Gain**

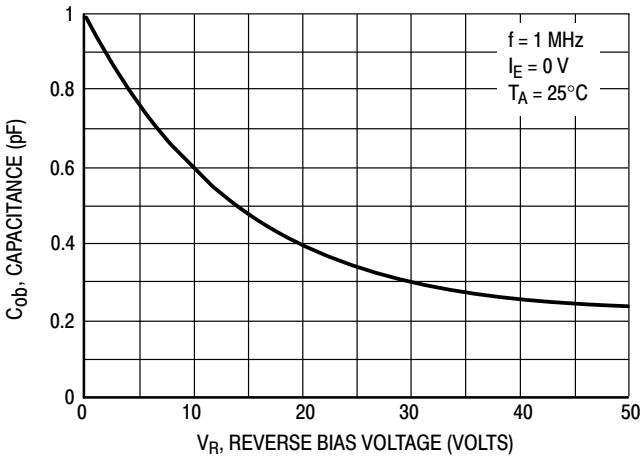



**Figure 3. Output Capacitance**

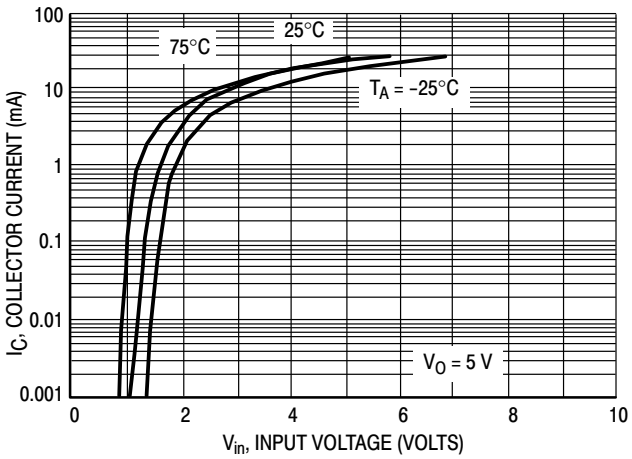



**Figure 4. Output Current versus Input Voltage**

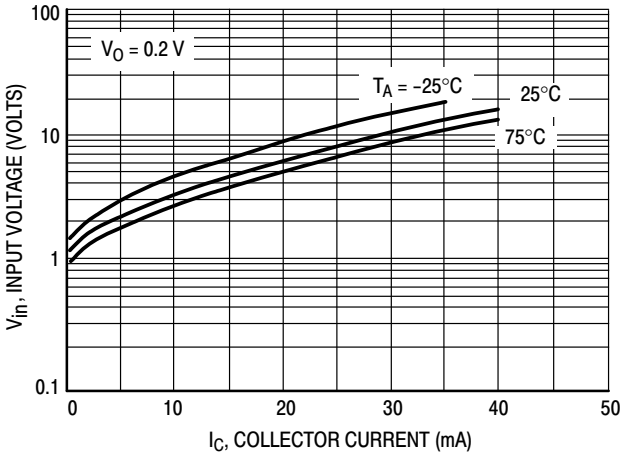



**Figure 5. Input Voltage versus Output Current**

## TYPICAL ELECTRICAL CHARACTERISTICS – Q2, PNP

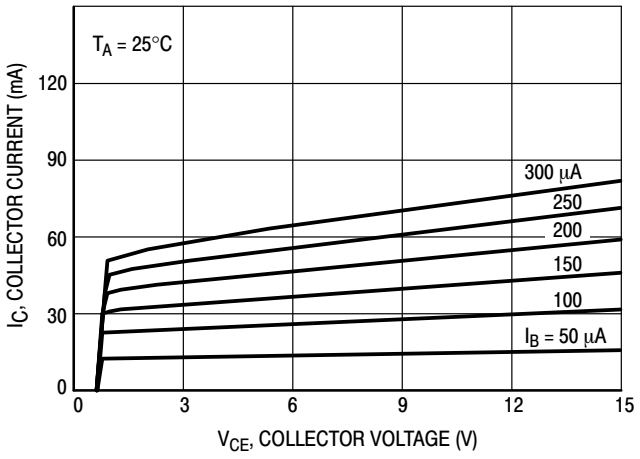



**Figure 6. $I_C$ – $V_{CE}$**

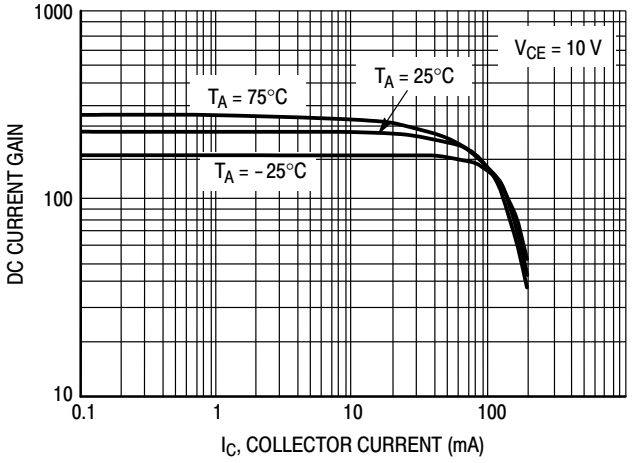



**Figure 7. DC Current Gain**

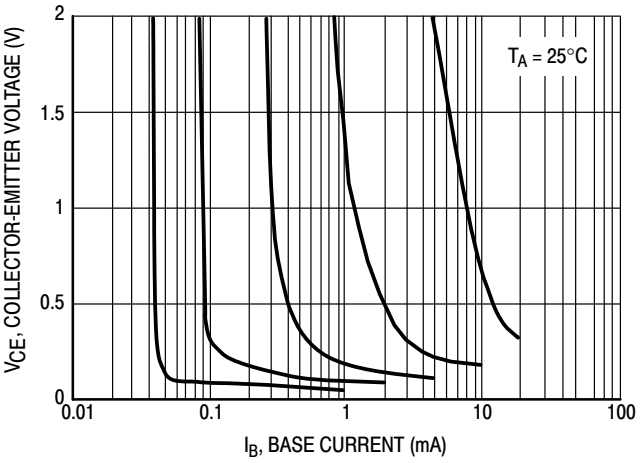



**Figure 8. Collector Saturation Region**

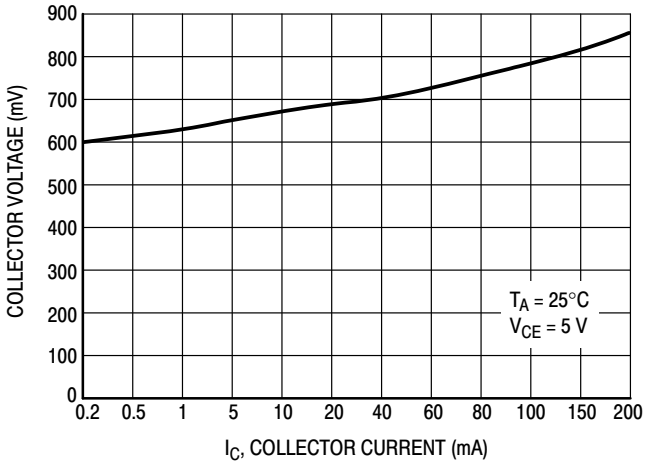



**Figure 9. On Voltage**

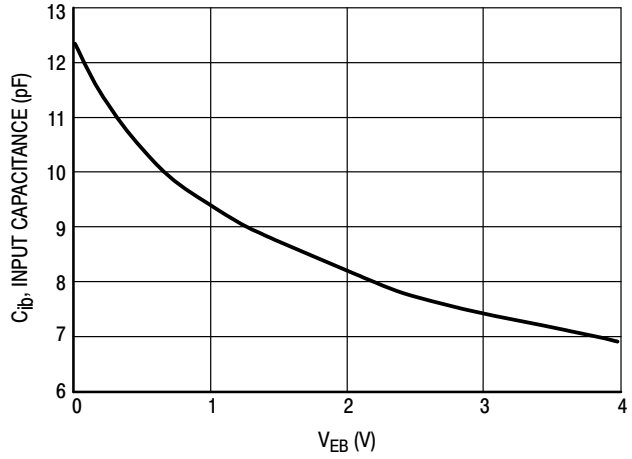



**Figure 10. Capacitance**

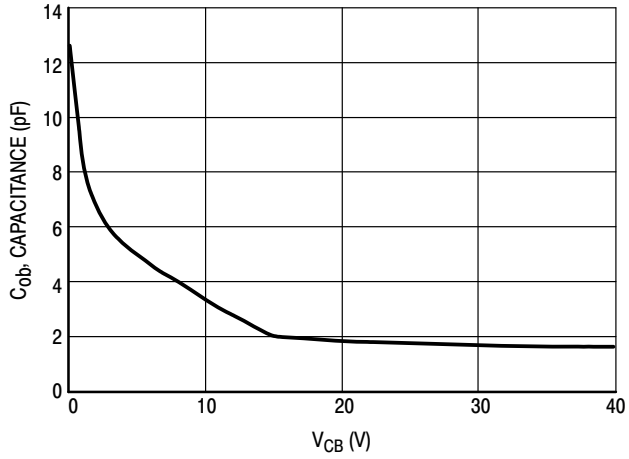
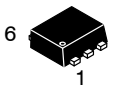



**Figure 11. Capacitance**

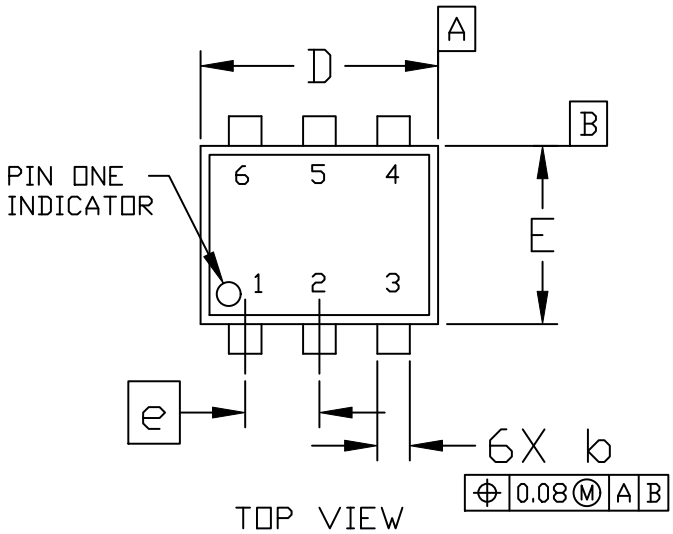



**SCALE 4:1**

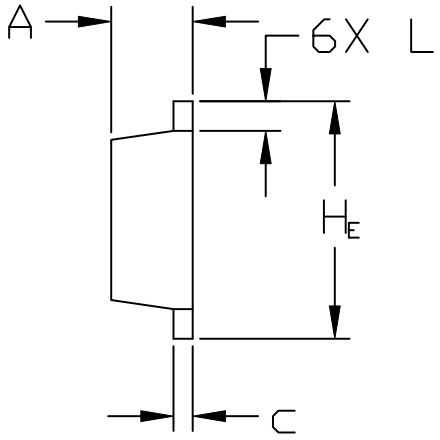
**SOT−563, 6 LEAD**
CASE 463A
ISSUE H

DATE 26 JAN 2021

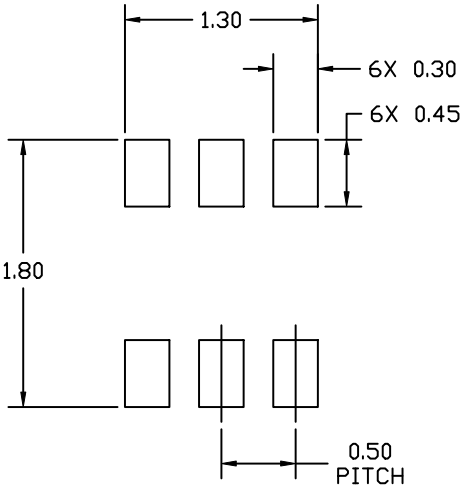
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.




TOP VIEW




SIDE VIEW




RECOMMENDED MOUNTING FOOTPRINT*

* For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.50 | 0.55 | 0.60 |
| b | 0.17 | 0.22 | 0.27 |
| c | 0.08 | 0.13 | 0.18 |
| D | 1.50 | 1.60 | 1.70 |
| E | 1.10 | 1.20 | 1.30 |
| e | 0.50 BSC | | |
| L | 0.10 | 0.20 | 0.30 |
| $H_E$ | 1.50 | 1.60 | 1.70 |

**SOT−563, 6 LEAD**
CASE 463A
ISSUE H

DATE 26 JAN 2021

STYLE 1:
PIN 1. EMITTER 1
2. BASE 1
3. COLLECTOR 2
4. EMITTER 2
5. BASE 2
6. COLLECTOR 1

STYLE 2:
PIN 1. EMITTER 1
2. EMITTER 2
3. BASE 2
4. COLLECTOR 2
5. BASE 1
6. COLLECTOR 1

STYLE 3:
PIN 1. CATHODE 1
2. CATHODE 1
3. ANODE/ANODE 2
4. CATHODE 2
5. CATHODE 2
6. ANODE/ANODE 1

STYLE 4:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

STYLE 5:
PIN 1. CATHODE
2. CATHODE
3. ANODE
4. ANODE
5. CATHODE
6. CATHODE

STYLE 6:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. ANODE
6. CATHODE

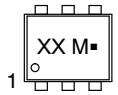
STYLE 8:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

STYLE 9:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

STYLE 10:
PIN 1. CATHODE 1
2. N/C
3. CATHODE 2
4. ANODE 2
5. N/C
6. ANODE 1

STYLE 11:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

**GENERIC**
**MARKING DIAGRAM***




XX = Specific Device Code
M = Month Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

| | | |
|---|---|---|
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