# MMST4403-7-F Datasheet


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| | |
|---|---|
| DiGi Electronics Part Number | MMST4403-7-F-DG |
| Manufacturer | Diodes Incorporated |
| Manufacturer Product Number | MMST4403-7-F |
| Description | TRANS PNP 40V 0.6A SOT323 |
| Detailed Description | Bipolar (BJT) Transistor PNP 40 V 600 mA 200MHz 200 mW Surface Mount SOT-323 |

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## Purchase and inquiry

| Manufacturer Product Number: | Manufacturer: |
| --- | --- |
| MMST4403-7-F | Diodes Incorporated |
| Series: | Product Status: |
| - | Active |
| Transistor Type: | Current - Collector (Ic) (Max): |
| PNP | 600 mA |
| Voltage - Collector Emitter Breakdown (Max): | Vce Saturation (Max) @ Ib, Ic: |
| 40 V | 750mV @ 50mA, 500mA |
| Current - Collector Cutoff (Max): | DC Current Gain (hFE) (Min) @ Ic, Vce: |
| - | 100 @ 150mA, 2V |
| Power - Max: | Frequency - Transition: |
| 200 mW | 200MHz |
| Operating Temperature: | Mounting Type: |
| -55°C ~ 150°C (TJ) | Surface Mount |
| Package / Case: | Supplier Device Package: |
| SC-70, SOT-323 | SOT-323 |
| Base Product Number: | |
| MMST4403 | |

## Environmental & Export classification

| RoHS Status: | Moisture Sensitivity Level (MSL): |
| --- | --- |
| ROHS3 Compliant | 1 (Unlimited) |
| REACH Status: | ECCN: |
| REACH Unaffected | EAR99 |
| HTSUS: | |
| 8541.21.0075 | |

Lead-free Green

**MMST4403**

**PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR**

## Features

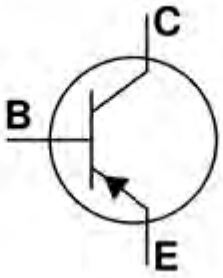
- Epitaxial Planar Die Construction
- Complementary NPN Type Available (MMST4401)
- Ultra-Small Surface Mount Package
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**

## Mechanical Data

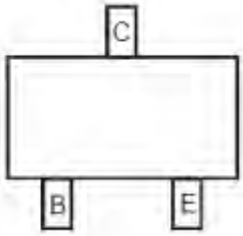
- Case: SOT-323
- Case Material: Molded Plastic, "Green" Molding Compound, Note 4. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Weight: 0.006 grams (approximate)

**SOT-323**

**Top view**




**Device symbol**



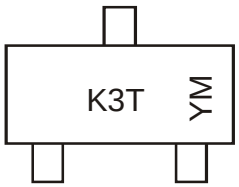

**Pinout – top view**

## Ordering Information (Note 3)

| Device | Packaging | Shipping |
|---|---|---|
| MMST4403-7-F | SOT-323 | 3000/Tape & Reel |

Notes: 1. No purposefully added lead.
2. Diodes Inc's "Green" Policy can be found on our website at http://www.diodes.com
3. For packaging details, go to our website at http://www.diodes.com

## Marking Information




K3T = Product Type Marking Code
YM = Date Code Marking
Y = Year ex: N = 2002
M = Month ex: 9 = September

Date Code Key

| Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| Code | X | Y | Z | A | B | C | D | E |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |

## Maximum Ratings @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | -40 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | -40 | V |
| Emitter-Base Voltage | $V_{EBO}$ | -5.0 | V |
| Collector Current – Continuous (Note 4) | $I_C$ | -600 | mA |
| Power Dissipation (Note 4) | $P_d$ | 200 | mW |
| Thermal Resistance, Junction to Ambient (Note 4) | $R_{\theta JA}$ | 625 | K/W |
| Operating and Storage Temperature Range | $T_j$, $T_{STG}$ | -55 to +150 | °C |

Notes: 4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch;

## Electrical Characteristics @$T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Min | Max | Unit | Test Condition |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 5)** | | | | | |
| Collector-Base Breakdown Voltage | $V_{(BR)CBO}$ | -40 | — | V | $I_C$ = -100μA, $I_E$ = 0 |
| Collector-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | -40 | — | V | $I_C$ = -1.0mA, $I_B$ = 0 |
| Emitter-Base Breakdown Voltage | $V_{(BR)EBO}$ | -5.0 | — | V | $I_E$ = -100μA, $I_C$ = 0 |
| Collector Cutoff Current | $I_{CEX}$ | — | -100 | nA | $V_{CE}$ = -35V, $V_{EB(OFF)}$ = -0.4V |
| Base Cutoff Current | $I_{BL}$ | — | -100 | nA | $V_{CE}$ = -35V, $V_{EB(OFF)}$ = -0.4V |
| **ON CHARACTERISTICS (Note 5)** | | | | | |
| DC Current Gain | $h_{FE}$ | 30<br>60<br>100<br>100<br>20 | —<br>—<br>—<br>300<br>— | — | $I_C$ = -100μA, $V_{CE}$ = -1.0V<br>$I_C$ = -1.0mA, $V_{CE}$ = -1.0V<br>$I_C$ = -10mA, $V_{CE}$ = -1.0V<br>$I_C$ = -150mA, $V_{CE}$ = -2.0V<br>$I_C$ = -500mA, $V_{CE}$ = -2.0V |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | — | -0.40<br>-0.75 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| Base-Emitter Saturation Voltage | $V_{BE(SAT)}$ | -0.75<br>— | -0.95<br>-1.30 | V | $I_C$ = -150mA, $I_B$ = -15mA<br>$I_C$ = -500mA, $I_B$ = -50mA |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | |
| Output Capacitance | $C_{ob}$ | — | 8.5 | pF | $V_{CB}$ = -10V, f = 1.0MHz, $I_E$ = 0 |
| Input Capacitance | $C_{eb}$ | — | 30 | pF | $V_{EB}$ = -0.5V, f = 1.0MHz, $I_C$ = 0 |
| Input Impedance | $h_{ie}$ | 1.5 | 15 | kΩ | $V_{CE}$ = -10V, $I_C$ = -1.0mA, f = 1.0MHz |
| Voltage Feedback Ratio | $h_{re}$ | 0.1 | 8.0 | x $10^{-4}$ | |
| Small Signal Current Gain | $h_{fe}$ | 60 | 500 | — | |
| Output Admittance | $h_{oe}$ | 1.0 | 100 | μS | |
| Current Gain-Bandwith Product | $f_T$ | 200 | — | MHz | $V_{CE}$ = -10V, $I_C$ = -20mA, f = 100MHz |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Delay Time | $t_d$ | — | 15 | ns | $V_{CE}$ = -30V, $I_C$ = -150mA, $V_{BE(OFF)}$ = -2.0V, $I_{B1}$ = -15mA |
| Rise Time | $t_r$ | — | 20 | ns | |
| Storage Time | $t_s$ | — | 225 | ns | $V_{CE}$ = -30V, $I_C$ = -150mA, $I_{B1}$ = $I_{B2}$ = -15mA |
| Fall Time | $t_r$ | — | 30 | ns | |

Notes: 5. Short duration pulse test used to minimize self-heating effect

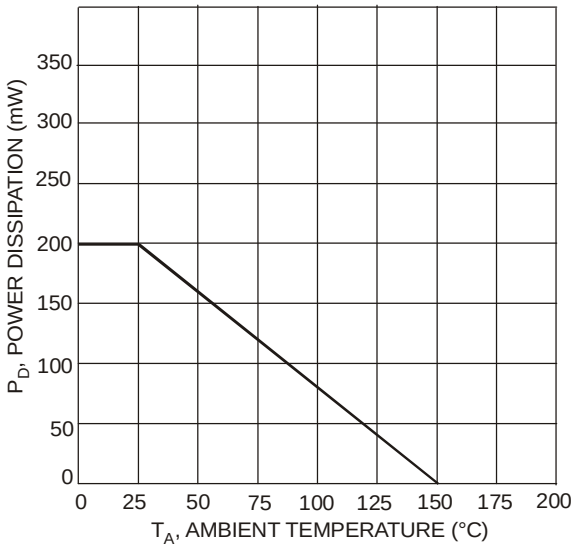



Fig. 1 Max Power Dissipation vs. Ambient Temperature

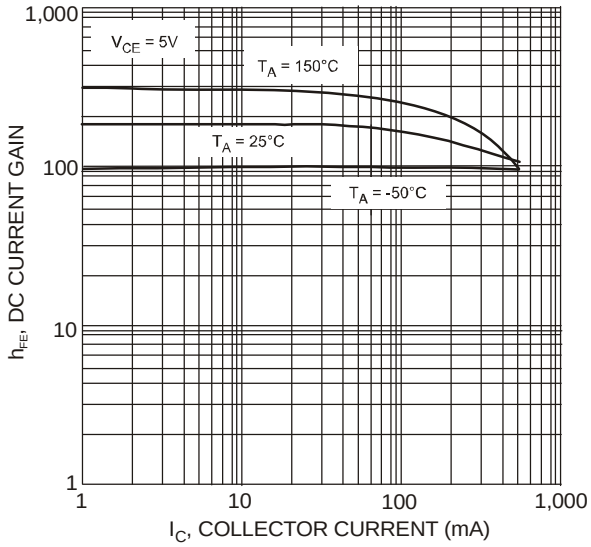



Fig. 2 DC Current Gain vs. Collector Current

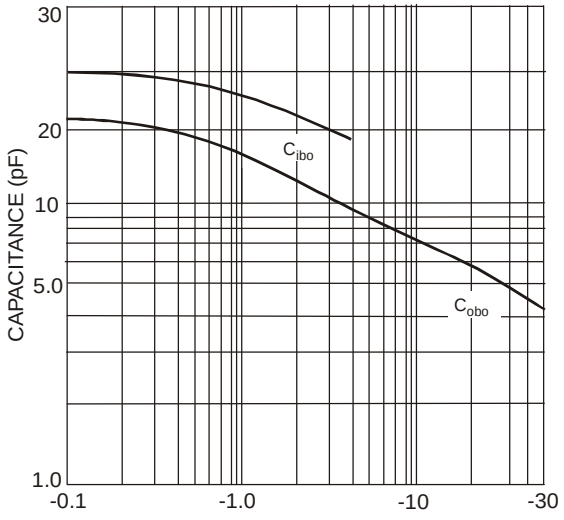



Fig. 3 Typical Capacitance

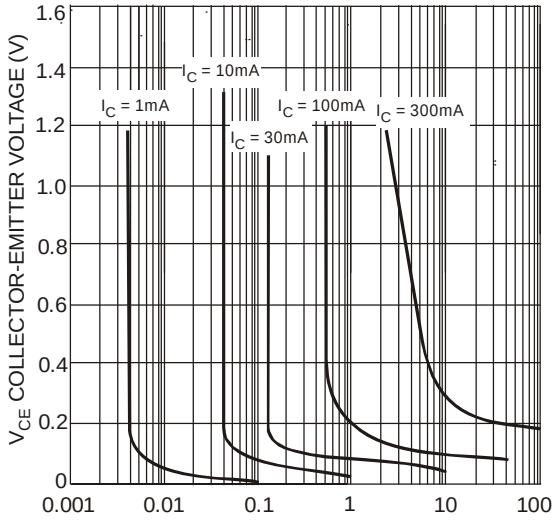



Fig. 4 Typical Collector Saturation Region

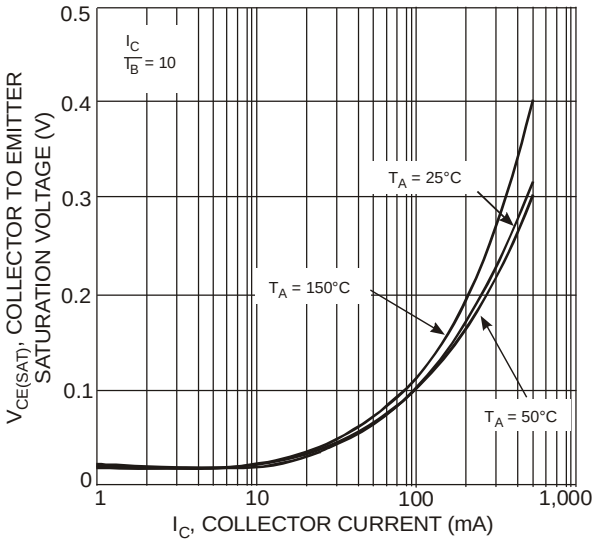



Fig. 5 Collector Emitter Saturation Voltage vs. Collector Current

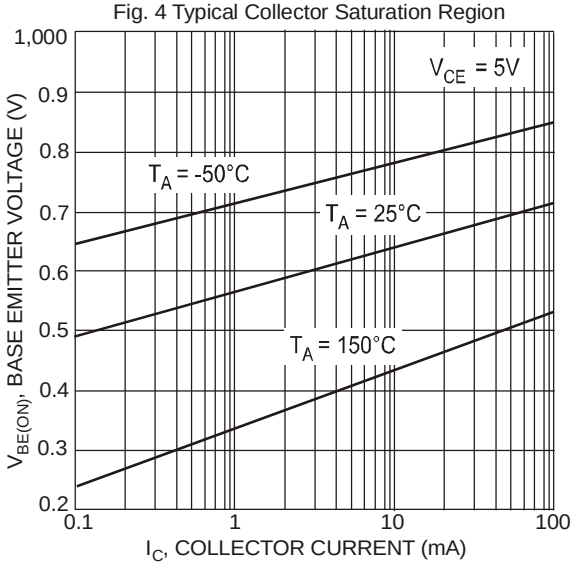



Fig. 6 Base-Emitter Voltage vs. Collector Current

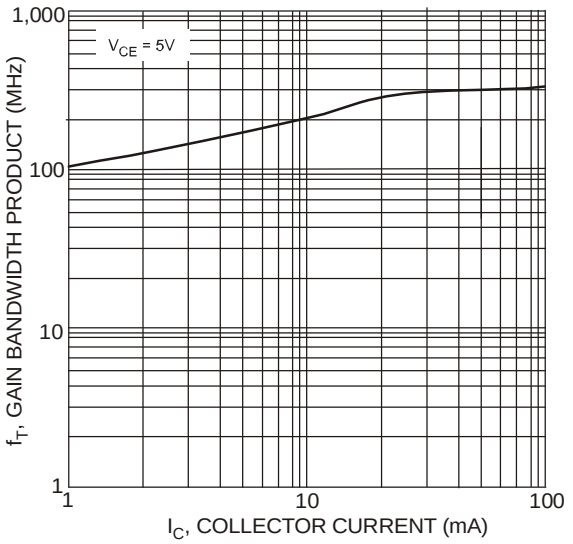
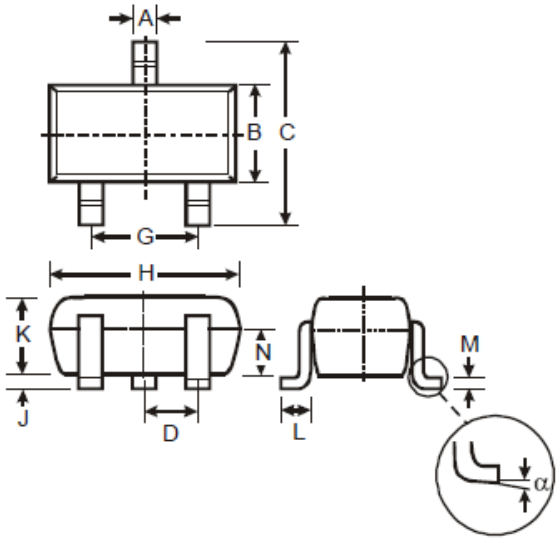


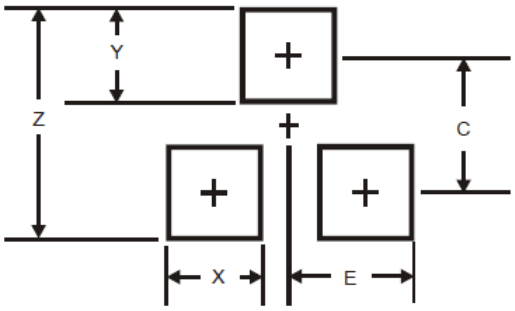

Fig. 7 Gain Bandwidth Product vs. Collector Current

## Package Outline Dimensions




| SOT-323 | | | |
|---|---|---|---|
| Dim | Min | Max | Typ |
| A | 0.25 | 0.40 | 0.30 |
| B | 1.15 | 1.35 | 1.30 |
| C | 2.00 | 2.20 | 2.10 |
| D | - | - | 0.65 |
| G | 1.20 | 1.40 | 1.30 |
| H | 1.80 | 2.20 | 2.15 |
| J | 0.0 | 0.10 | 0.05 |
| K | 0.90 | 1.00 | 1.00 |
| L | 0.25 | 0.40 | 0.30 |
| M | 0.10 | 0.18 | 0.11 |
| N | - | - | - |
| α | 0° | 8° | - |
| All Dimensions in mm | | | |

## Suggested Pad Layout




| Dimensions | SOT-323 |
|---|---|
| Z | 2.8 |
| X | 0.7 |
| Y | 0.9 |
| C | 1.9 |
| E | 1.0 |

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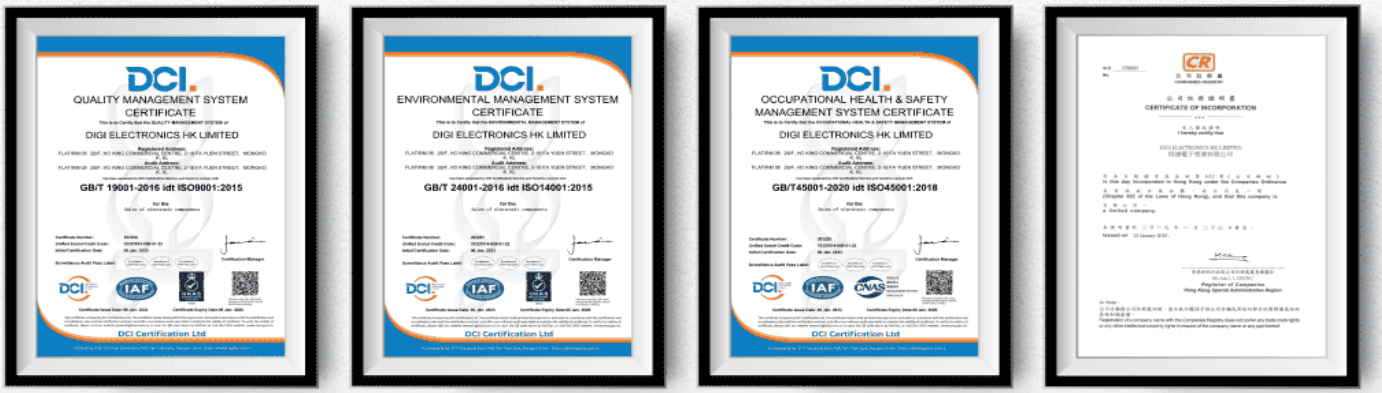



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