



**THE DATASHEET OF  
DMMT3904W-7**



**40V MATCHED PAIR NPN SMALL SIGNAL TRANSISTOR IN SOT363**
**Features**

- $BV_{CEO} > 40V$
- $I_C = 200mA$  High Collector Current
- Pair of NPN Transistors that are Intrinsicly Matched (Note 1)
- 2% Matching on Current Gain ( $h_{FE}$ )
- 2mV Matching on Base-Emitter Voltage ( $V_{BE}$ )
- Fully Internally Isolated in a Small Surface Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 2 & 3)**
- **Halogen and Antimony Free. "Green" Device (Note 4)**
- **An Automotive-Compliant Part is Available Under Separate Datasheet DIODES™ (DMMT3904WQ)**

**Mechanical Data**

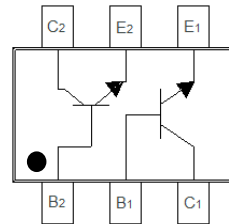
- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 @3
- Weight: 0.006 grams (Approximate)

**Applications**

- Current mirrors
- Differential and instrumentation amplifiers
- Comparators



Top View

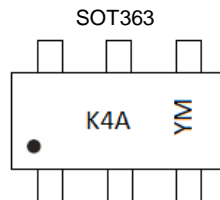


Device Schematic and Pin-Out Top View

**Ordering Information (Note 5)**

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
DMMT3904W-7-F	SOT363	K4A	7	8	3,000	Reel

- Notes:
1. Intrinsicly matched pair as this is built with adjacent die from the same wafer.
  2. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  3. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  4. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

**Marking Information**


K4A = Product Type Marking Code  
 YM = Date Code Marking  
 Y or  $\bar{Y}$  = Year (ex: J = 2022)  
 M = Month (ex: 6 = June)

## Date Code Key

Year	2002	...	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	O	...	J	K	L	M	N	O	P	R	S	T
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

**Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6.0	V
Collector Current	I <sub>C</sub>	200	mA

**Thermal Characteristics – Total Device** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6) Total Device	P <sub>D</sub>	200	mW
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	625	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

**ESD Ratings** (Note 7)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
6. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR-4 PCB; the device is measured under still air conditions whilst operating in a steady-state.
  7. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

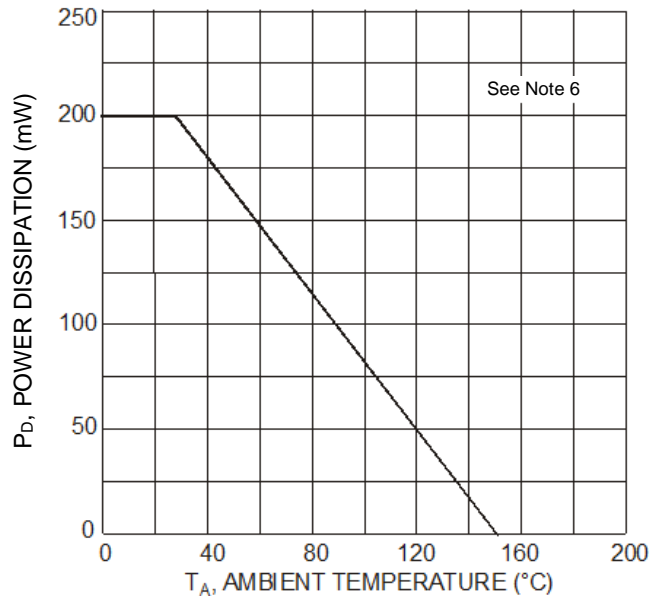
**Thermal Characteristics – Total Device**


Figure 1. Power Derating Curve (Total Device)

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	60	—	—	V	I <sub>C</sub> = 100μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage (Note 8)	BV <sub>CEO</sub>	40	—	—	V	I <sub>C</sub> = 1.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	6.0	—	—	V	I <sub>E</sub> = 100μA, I <sub>C</sub> = 0
Collector Cutoff Current	I <sub>CEX</sub>	—	—	50	nA	V <sub>CE</sub> = 30V, V <sub>EB(OFF)</sub> = 3.0V
Base Cutoff Current	I <sub>BL</sub>	—	—	50	nA	V <sub>CE</sub> = 30V, V <sub>EB(OFF)</sub> = 3.0V
<b>ON CHARACTERISTICS (Note 8)</b>						
DC Current Gain	h <sub>FE</sub>	40 70 100 60 30	—	— — 300 — —	—	I <sub>C</sub> = 100μA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 1.0mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 10mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 50mA, V <sub>CE</sub> = 1.0V I <sub>C</sub> = 100mA, V <sub>CE</sub> = 1.0V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	—	—	200 300	mV	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	650 —	—	850 950	mV	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA I <sub>C</sub> = 50mA, I <sub>B</sub> = 5.0mA
<b>MATCHING CHARACTERISTICS</b>						
DC Current Gain Matching (Note 9)	h <sub>FE1</sub> / h <sub>FE2</sub>	—	1	2	%	I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V
Base-Emitter Voltage Matching (Note 10)	V <sub>BE1</sub> - V <sub>BE2</sub>	—	1	2	mV	I <sub>C</sub> = 2mA, V <sub>CE</sub> = 5V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)1</sub> / V <sub>CE(sat)2</sub>	—	1	2	%	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)1</sub> / V <sub>BE(sat)2</sub>	—	1	2	%	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1.0mA
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	C <sub>obo</sub>	—	—	4.0	pF	V <sub>CB</sub> = 5.0V, f = 1.0MHz, I <sub>E</sub> = 0
Input Capacitance	C <sub>ibo</sub>	—	—	8.0	pF	V <sub>EB</sub> = 0.5V, f = 1.0MHz, I <sub>C</sub> = 0
Input Impedance	h <sub>ie</sub>	1.0	—	10	kΩ	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h <sub>re</sub>	0.5	—	8	x 10 <sup>-4</sup>	
Small Signal Current Gain	h <sub>fe</sub>	100	—	400	—	
Output Admittance	h <sub>oe</sub>	1.0	—	40	μS	
Current Gain-Bandwidth Product	f <sub>T</sub>	300	—	—	MHz	
Noise Figure	NF	—	—	5.0	dB	V <sub>CE</sub> = 5.0V, I <sub>C</sub> = 100μA, R <sub>S</sub> = 1.0kΩ, f = 1.0kHz
<b>SWITCHING CHARACTERISTICS</b>						
Delay Time	t <sub>d</sub>	—	—	35	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA,
Rise Time	t <sub>r</sub>	—	—	35	ns	V <sub>BE(on)</sub> = -0.5V, I <sub>B1</sub> = 1.0mA
Storage Time	t <sub>s</sub>	—	—	200	ns	V <sub>CC</sub> = 3.0V, I <sub>C</sub> = 10mA,
Fall Time	t <sub>f</sub>	—	—	50	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 1.0mA

- Notes:
- 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
  - 9. Is the ratio of one transistor compared to the other transistor.
  - 10. V<sub>BE1</sub> - V<sub>BE2</sub> is the absolute difference of one transistor compared to the other transistor.

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

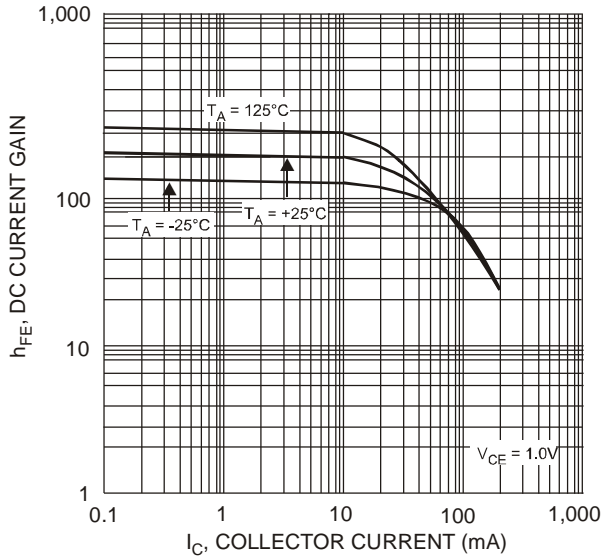


Figure 2. Typical DC Current Gain vs. Collector Current

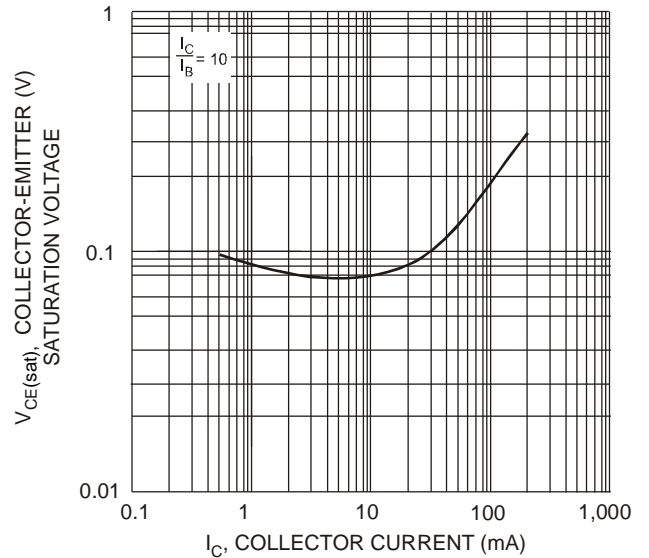


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current

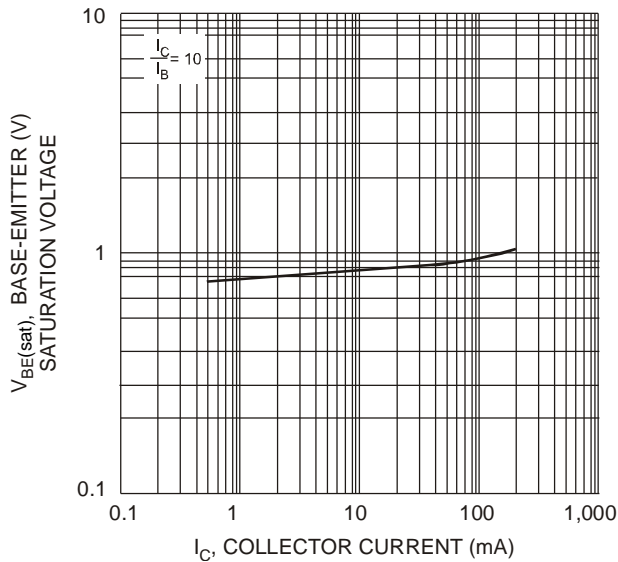


Figure 4. Typical Base-Emitter Saturation Voltage vs. Collector Current

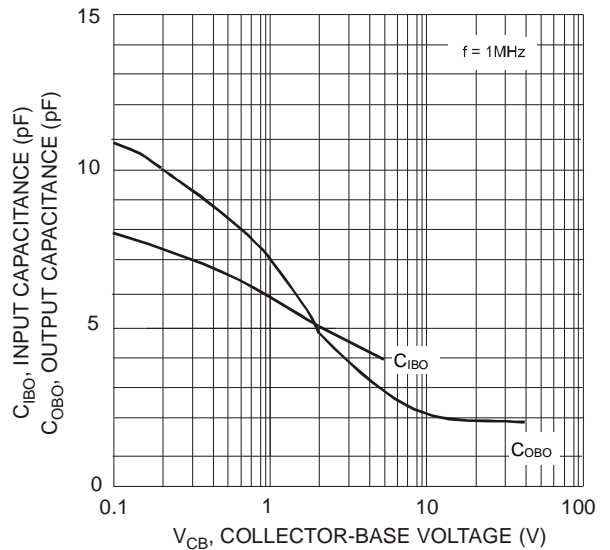
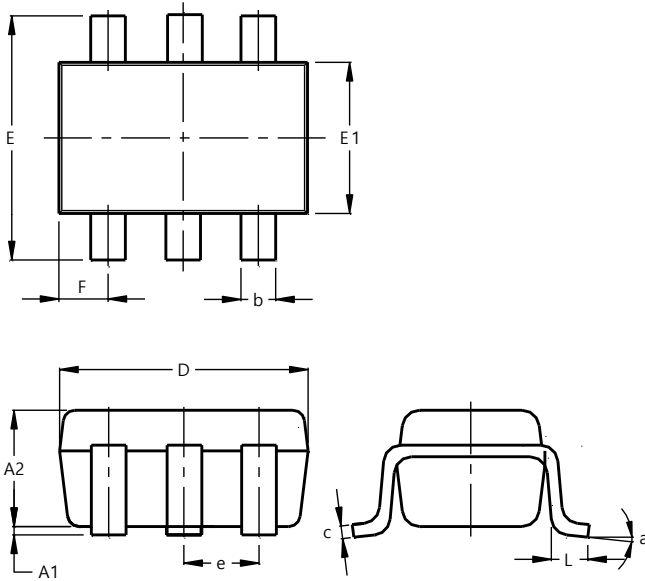


Figure 5. Input and Output Capacitance vs. Collector-Base Voltage

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**

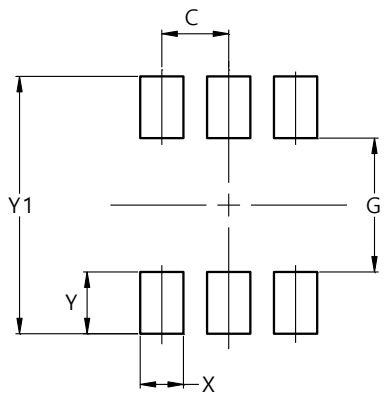


SOT363			
Dim	Min	Max	Typ
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
<b>All Dimensions in mm</b>			

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**SOT363**



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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