

## **Excellent Integrated System Limited**

Stocking Distributor

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[Diodes Incorporated](#)  
[DMMT3904W-7](#)

For any questions, you can email us directly:

[sales@integrated-circuit.com](mailto:sales@integrated-circuit.com)

## Features

- BVceo > 40V
- Ic = 200mA high Collector Current
- Pair of NPN transistors that are intrinsically 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)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 5)

## Mechanical Data

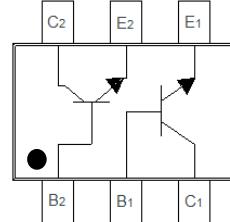
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 ④③
- Weight: 0.006 grams (approximate)

## Applications

- Current mirrors
- Differential and instrumentation amplifiers
- Comparators



Top View



Device Schematic and Pin-Out  
Top View

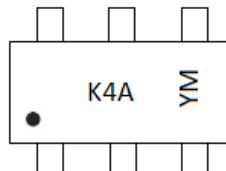
## Ordering Information (Note 4 & 5)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DMMT3904W-7-F	AEC-Q101	K4A	7	8	3,000
DMMT3904WQ-7-F	Automotive	K4A	7	8	3,000

Notes:

1. Intrinsically 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) compliant.
3. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
6. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



K4A = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: B = 2014)  
 M = Month (ex: 2 = February)

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	0	N	D



**DMMT3904W**

### Absolute Maximum Ratings (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	60	V
Collector-Emitter Voltage	$V_{CEO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current	$I_C$	200	mA

### Thermal Characteristics – Total Device (@ $T_A = +25^\circ\text{C}$ unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 7) Total Device	$P_D$	200	mW
Thermal Resistance, Junction to Ambient (Note 7)	$R_{JJA}$	625	°C/W
Operating and Storage Temperature Range	$T_J, T_{STG}$	-65 to +150	°C

### ESD Ratings (Note 8)

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

Note: 7. For a device mounted on minimum recommended pad layout with 1oz copper that is on a single-sided 1.6mm FR4 PCB; the device is measured under still air conditions whilst operating in a steady-state.  
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

### Thermal Characteristics – Total Device

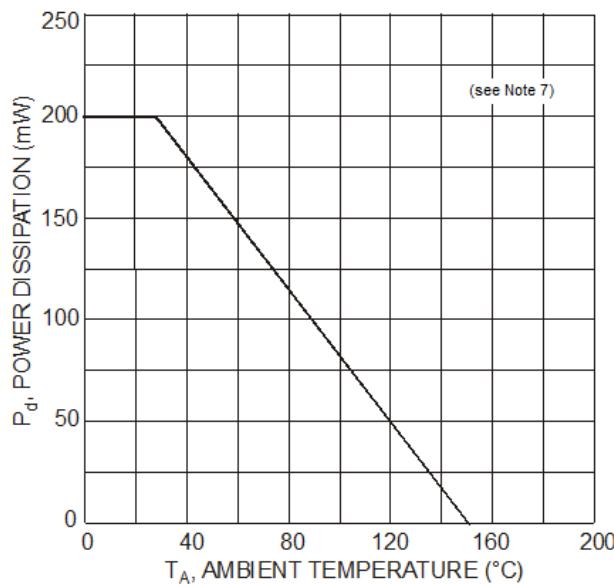


Fig. 1, Power Derating Curve (Total Device)



**DMMT3904W**

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Collector-Base Breakdown Voltage	$\text{BV}_{\text{CBO}}$	60	—	—	V	$I_C = 100\mu\text{A}$ , $I_E = 0$
Collector-Emitter Breakdown Voltage (Note 9)	$\text{BV}_{\text{CEO}}$	40	—	—	V	$I_C = 1.0\text{mA}$ , $I_B = 0$
Emitter-Base Breakdown Voltage	$\text{BV}_{\text{EBO}}$	6.0	—	—	V	$I_E = 100\mu\text{A}$ , $I_C = 0$
Collector Cutoff Current	$I_{\text{CEX}}$	—	—	50	nA	$V_{\text{CE}} = 30\text{V}$ , $V_{\text{EB}(\text{OFF})} = 3.0\text{V}$
Base Cutoff Current	$I_{\text{BL}}$	—	—	50	nA	$V_{\text{CE}} = 30\text{V}$ , $V_{\text{EB}(\text{OFF})} = 3.0\text{V}$
<b>ON CHARACTERISTICS (Note 9)</b>						
DC Current Gain	$h_{\text{FE}}$	40	—	—	—	$I_C = 100\mu\text{A}$ , $V_{\text{CE}} = 1.0\text{V}$
		70	—	—	—	$I_C = 1.0\text{mA}$ , $V_{\text{CE}} = 1.0\text{V}$
		100	—	300	—	$I_C = 10\text{mA}$ , $V_{\text{CE}} = 1.0\text{V}$
		60	—	—	—	$I_C = 50\text{mA}$ , $V_{\text{CE}} = 1.0\text{V}$
		30	—	—	—	$I_C = 100\text{mA}$ , $V_{\text{CE}} = 1.0\text{V}$
Collector-Emitter Saturation Voltage	$V_{\text{CE}(\text{SAT})}$	—	—	200 300	mV	$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$ $I_C = 50\text{mA}$ , $I_B = 5.0\text{mA}$
Base-Emitter Saturation Voltage	$V_{\text{BE}(\text{SAT})}$	0.65 —	—	850 950	mV	$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$ $I_C = 50\text{mA}$ , $I_B = 5.0\text{mA}$
<b>MATCHING CHARACTERISTICS</b>						
DC Current Gain Matching (Note 10)	$h_{\text{FE}1} / h_{\text{FE}2}$	—	1	2	%	$I_C = 2\text{mA}$ , $V_{\text{CE}} = 5\text{V}$
Base-Emitter Voltage Matching (Note 11)	$V_{\text{BE}1} - V_{\text{BE}2}$	—	1	2	mV	$I_C = 2\text{mA}$ , $V_{\text{CE}} = 5\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{\text{CE}(\text{SAT})1} / V_{\text{CE}(\text{SAT})2}$	—	1	2	%	$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{\text{BE}(\text{SAT})1} / V_{\text{BE}(\text{SAT})2}$	—	1	2	%	$I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Output Capacitance	$C_{\text{obo}}$	—	—	4.0	pF	$V_{\text{CB}} = 5.0\text{V}$ , $f = 1.0\text{MHz}$ , $I_E = 0$
Input Capacitance	$C_{\text{ibo}}$	—	—	8.0	pF	$V_{\text{EB}} = 0.5\text{V}$ , $f = 1.0\text{MHz}$ , $I_C = 0$
Input Impedance	$h_{\text{ie}}$	1.0	—	10	k $\Omega$	$V_{\text{CE}} = 10\text{V}$ , $I_C = 1.0\text{mA}$ , $f = 1.0\text{kHz}$
Voltage Feedback Ratio	$h_{\text{re}}$	0.5	—	8	$\times 10^{-4}$	
Small Signal Current Gain	$h_{\text{fe}}$	100	—	400	—	
Output Admittance	$h_{\text{oe}}$	1.0	—	40	$\mu\text{S}$	
Current Gain-Bandwidth Product	$f_T$	300	—	—	MHz	$V_{\text{CE}} = 20\text{V}$ , $I_C = 10\text{mA}$ , $f = 100\text{MHz}$
Noise Figure	NF	—	—	5.0	dB	$V_{\text{CE}} = 5.0\text{V}$ , $I_C = 100\mu\text{A}$ , $R_S = 1.0\text{k}\Omega$ , $f = 1.0\text{kHz}$
<b>SWITCHING CHARACTERISTICS</b>						
Delay Time	$t_d$	—	—	35	ns	$V_{\text{CC}} = 3.0\text{V}$ , $I_C = 10\text{mA}$ , $V_{\text{BE}(\text{off})} = -0.5\text{V}$ , $I_{B1} = 1.0\text{mA}$
Rise Time	$t_r$	—	—	35	ns	
Storage Time	$t_s$	—	—	200	ns	
Fall Time	$t_f$	—	—	50	ns	

Note: 9. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

10. Is the ratio of one transistor compared to the other transistor.

11.  $V_{\text{BE}1} - V_{\text{BE}2}$  is the absolute difference of one transistor compared to the other transistor.

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

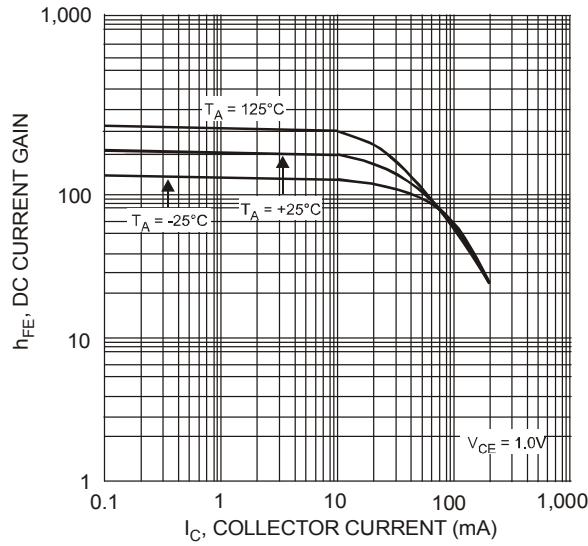


Fig. 3, Typical DC Current Gain vs.  
Collector Current

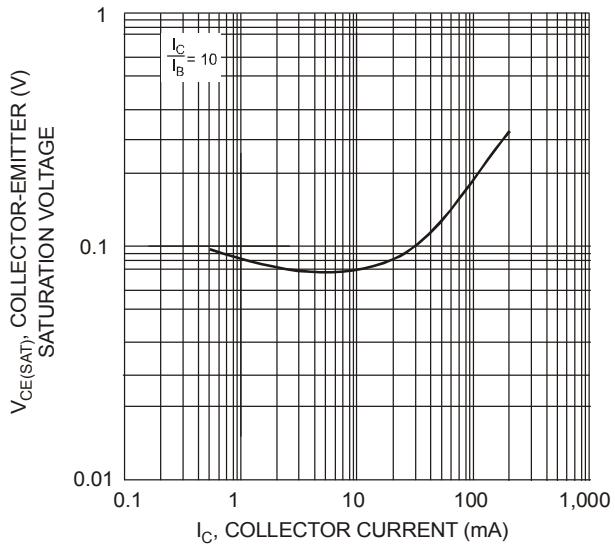


Fig. 4, Typical Collector-Emitter  
Saturation Voltage vs. Collector Current

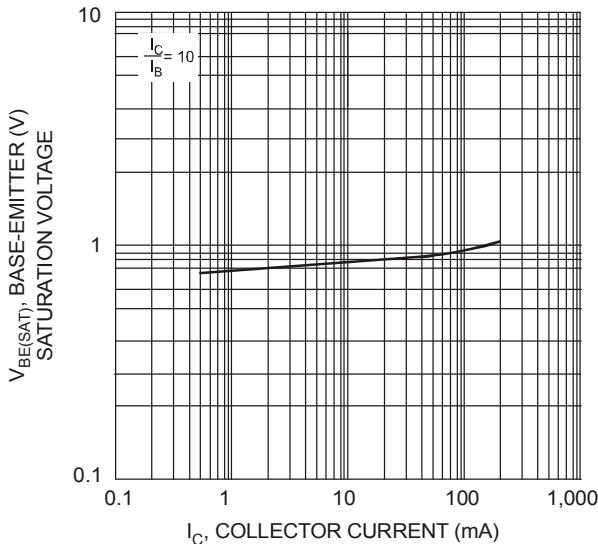


Fig. 5, Typical Base-Emitter  
Saturation Voltage vs. Collector Current

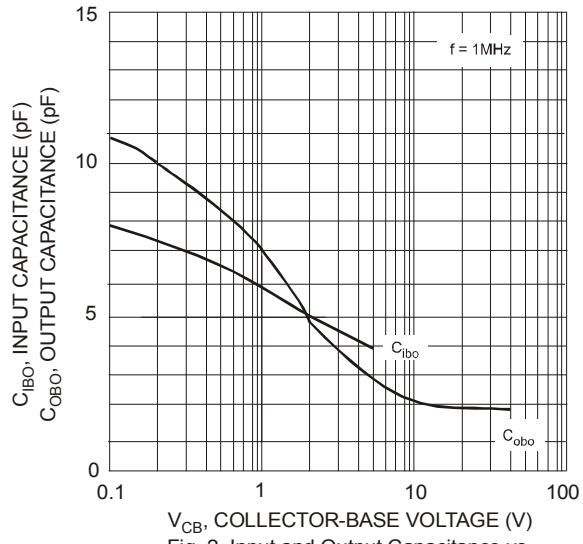
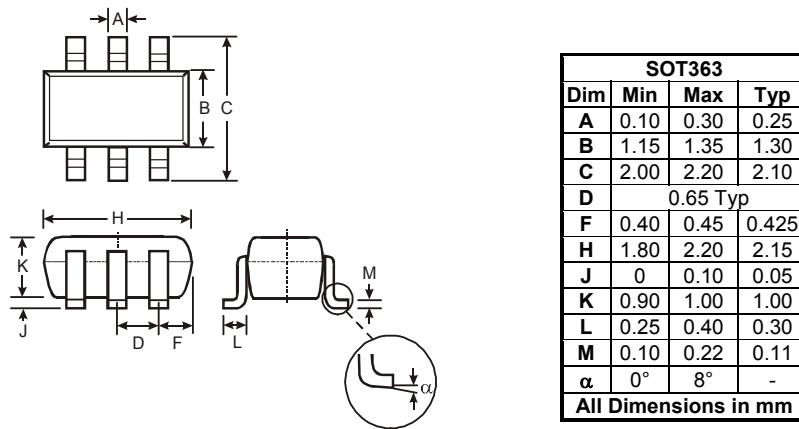


Fig. 2, Input and Output Capacitance vs.  
Collector-Base Voltage

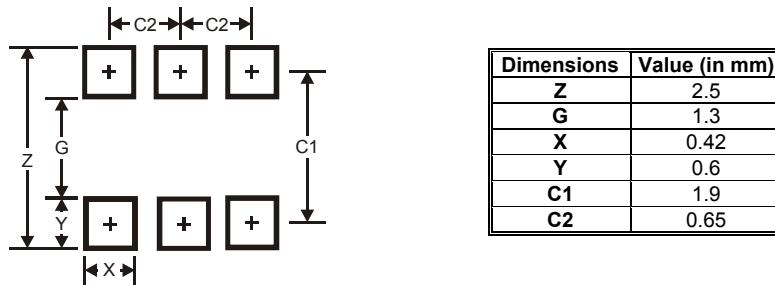
## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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