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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



40V MATCHED PAIR NPN SMALL SIGNAL TRANSISTOR IN SOT363
Features

- $BV_{ce0} > 40V$
- $I_C = 200mA$ 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

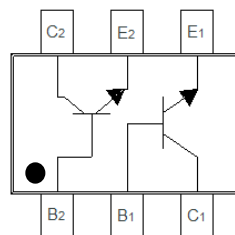
- Case: SOT363
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 ^{Ⓔ3}
- Weight: 0.006 grams (approximate)

Applications

- Current mirrors
- Differential and instrumentation amplifiers
- Comparators



Top View

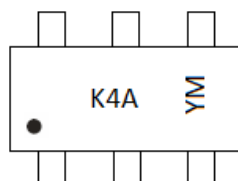


Device Schematic and Pin-Out Top View

Ordering Information (Note 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 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/.
 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	O	N	D

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)	$R_{\theta JA}$	625	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-65 to +150	$^\circ\text{C}$

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.

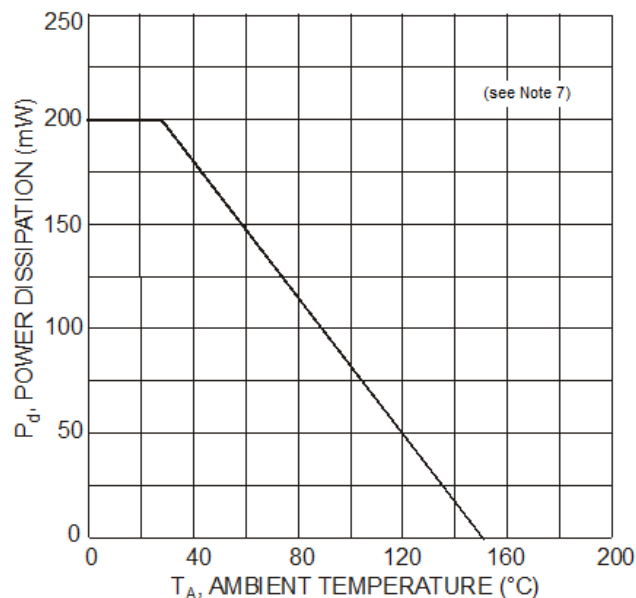
Thermal Characteristics – Total Device


Fig. 1, Power Derating Curve (Total Device)

Electrical Characteristics (@T_A = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CBO}	60	—	—	V	I _C = 100μA, I _E = 0
Collector-Emitter Breakdown Voltage(Note 9)	BV _{CEO}	40	—	—	V	I _C = 1.0mA, I _B = 0
Emitter-Base Breakdown Voltage	BV _{EBO}	6.0	—	—	V	I _E = 100μA, I _C = 0
Collector Cutoff Current	I _{CEX}	—	—	50	nA	V _{CE} = 30V, V _{EB(OFF)} = 3.0V
Base Cutoff Current	I _{BL}	—	—	50	nA	V _{CE} = 30V, V _{EB(OFF)} = 3.0V
ON CHARACTERISTICS (Note 9)						
DC Current Gain	h _{FE}	40 70 100 60 30	—	— — 300 — —	—	I _C = 100μA, V _{CE} = 1.0V I _C = 1.0mA, V _{CE} = 1.0V I _C = 10mA, V _{CE} = 1.0V I _C = 50mA, V _{CE} = 1.0V I _C = 100mA, V _{CE} = 1.0V
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	—	—	200 300	mV	I _C = 10mA, I _B = 1.0mA I _C = 50mA, I _B = 5.0mA
Base-Emitter Saturation Voltage	V _{BE(SAT)}	0.65 —	—	850 950	mV	I _C = 10mA, I _B = 1.0mA I _C = 50mA, I _B = 5.0mA
MATCHING CHARACTERISTICS						
DC Current Gain Matching (Note 10)	h _{FE1} / h _{FE2}	—	1	2	%	I _C = 2mA, V _{CE} = 5V
Base-Emitter Voltage Matching (Note 11)	V _{BE1} - V _{BE2}	—	1	2	mV	I _C = 2mA, V _{CE} = 5V
Collector-Emitter Saturation Voltage (Note 10)	V _{CE(SAT)1} / V _{CE(SAT)2}	—	1	2	%	I _C = 10mA, I _B = 1.0mA
Base-Emitter Saturation Voltage (Note 10)	V _{BE(SAT)1} / V _{BE(SAT)2}	—	1	2	%	I _C = 10mA, I _B = 1.0mA
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C _{obo}	—	—	4.0	pF	V _{CB} = 5.0V, f = 1.0MHz, I _E = 0
Input Capacitance	C _{ibo}	—	—	8.0	pF	V _{EB} = 0.5V, f = 1.0MHz, I _C = 0
Input Impedance	h _{ie}	1.0	—	10	kΩ	V _{CE} = 10V, I _C = 1.0mA, f = 1.0kHz
Voltage Feedback Ratio	h _{re}	0.5	—	8	x 10 ⁻⁴	
Small Signal Current Gain	h _{fe}	100	—	400	—	
Output Admittance	h _{oe}	1.0	—	40	μS	
Current Gain-Bandwidth Product	f _T	300	—	—	MHz	V _{CE} = 20V, I _C = 10mA, f = 100MHz
Noise Figure	NF	—	—	5.0	dB	V _{CE} = 5.0V, I _C = 100μA, R _S = 1.0kΩ, f = 1.0kHz
SWITCHING CHARACTERISTICS						
Delay Time	t _d	—	—	35	ns	V _{CC} = 3.0V, I _C = 10mA, V _{BE(off)} = -0.5V, I _{B1} = 1.0mA
Rise Time	t _r	—	—	35	ns	
Storage Time	t _s	—	—	200	ns	V _{CC} = 3.0V, I _C = 10mA, I _{B1} = I _{B2} = 1.0mA
Fall Time	t _f	—	—	50	ns	

- Note:
9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.
 10. Is the ratio of one transistor compared to the other transistor.
 11. V_{BE1} - V_{BE2} is the absolute difference of one transistor compared to the other transistor.

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

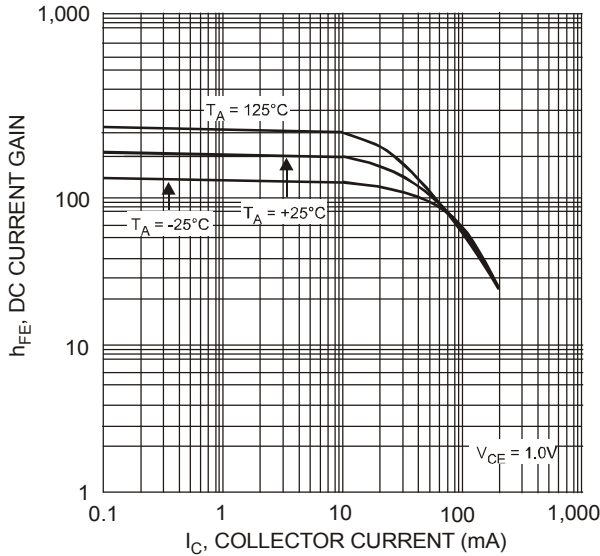


Fig. 3, Typical DC Current Gain vs. Collector Current

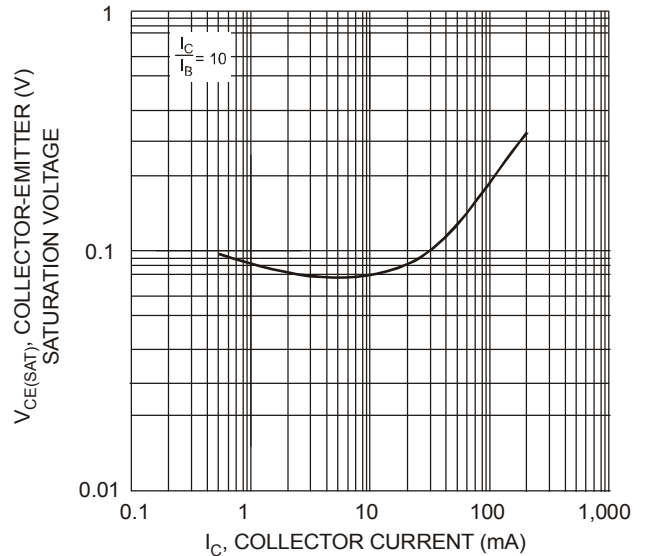


Fig. 4, Typical Collector-Emitter Saturation Voltage vs. Collector Current

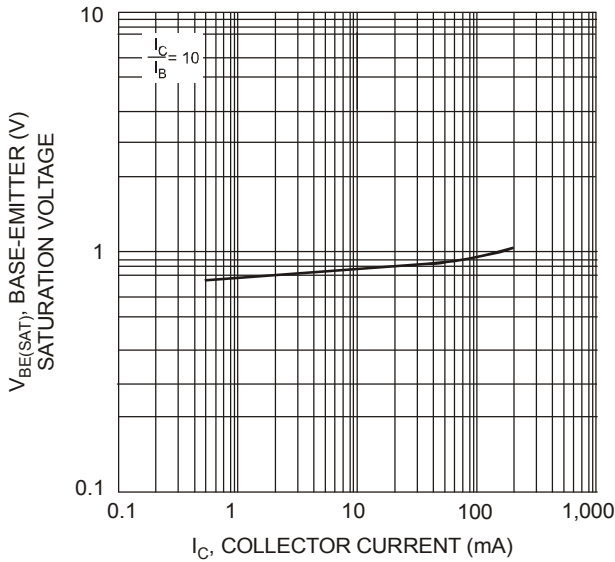


Fig. 5, Typical Base-Emitter Saturation Voltage vs. Collector Current

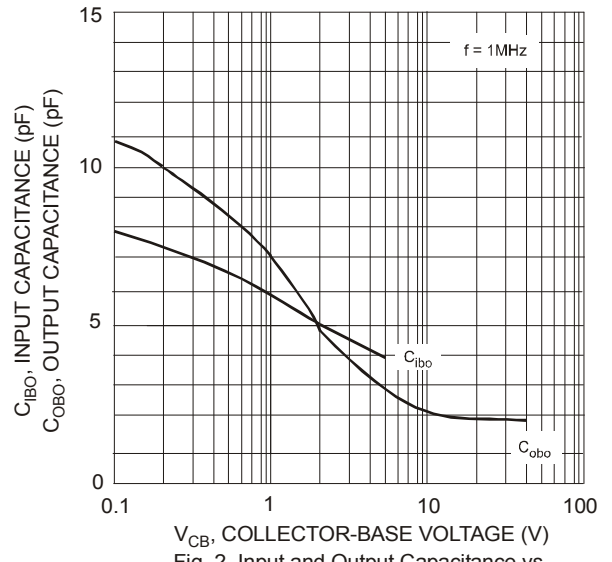
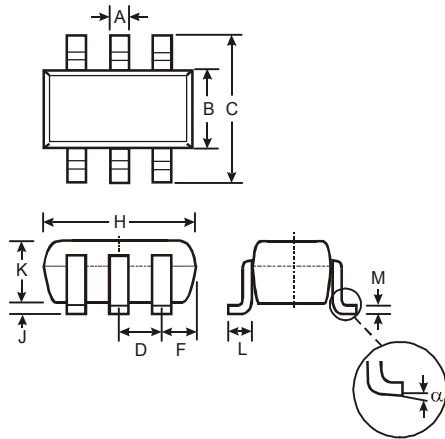


Fig. 2, Input and Output Capacitance vs. Collector-Base Voltage

Package Outline Dimensions

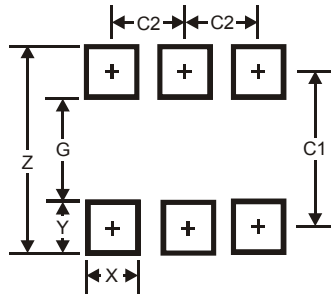
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



SOT363			
Dim	Min	Max	Typ
A	0.10	0.30	0.25
B	1.15	1.35	1.30
C	2.00	2.20	2.10
D	0.65 Typ		
F	0.40	0.45	0.425
H	1.80	2.20	2.15
J	0	0.10	0.05
K	0.90	1.00	1.00
L	0.25	0.40	0.30
M	0.10	0.22	0.11
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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



Dimensions	Value (in mm)
Z	2.5
G	1.3
X	0.42
Y	0.6
C1	1.9
C2	0.65

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