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 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)**
- **An Automotive-Compliant Part is Available Under Separate Datasheet DIODES™ (DMMT3904WQ)**

Mechanical Data

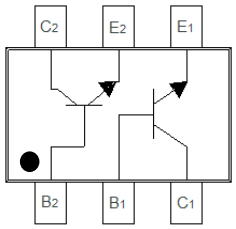
- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — Matte Tin Finish. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (Approximate)

Applications

- Current mirrors
- Differential and instrumentation amplifiers
- Comparators

SOT363

Top View



Device Schematic and Pin-Out
Top View

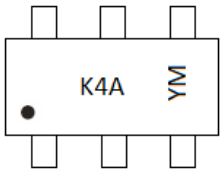
Ordering Information (Note 5)

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. 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) & 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

SOT363



K4A = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = 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_A = +25°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°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6) Total Device	P_D	200	mW
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-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

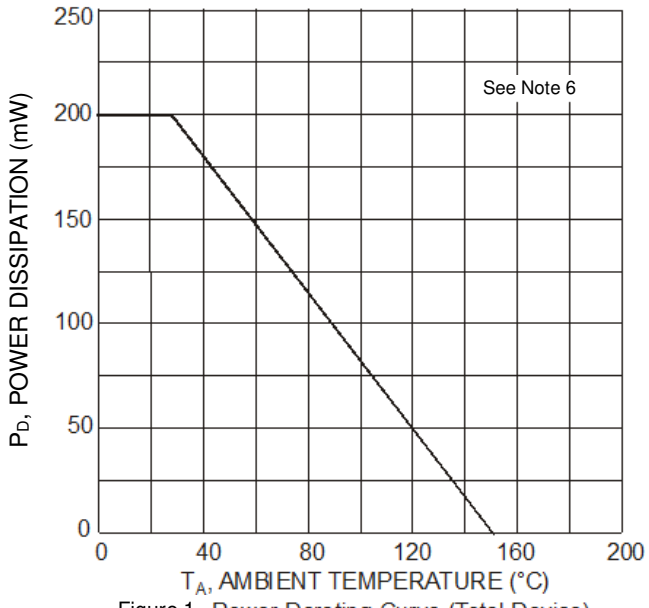


Figure 1. Power Derating Curve (Total Device)

Electrical Characteristics (@T_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 8)	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 8)						
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	$V_{BE(sat)}$	650 —	—	850 950	mV	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
MATCHING CHARACTERISTICS						
DC Current Gain Matching (Note 9)	h_{FE1} / h_{FE2}	—	1	2	%	I_C = 2mA, V_{CE} = 5V
Base-Emitter Voltage Matching (Note 10)	V_{BE1} - V_{BE2}	—	1	2	mV	I_C = 2mA, V_{CE} = 5V
Collector-Emitter Saturation Voltage (Note 9)	$V_{CE(sat)1}$ / $V_{CE(sat)2}$	—	1	2	%	I_C = 10mA, I_B = 1.0mA
Base-Emitter Saturation Voltage (Note 9)	$V_{BE(sat)1}$ / $V_{BE(sat)2}$	—	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, $V_{BE(on)}$ = -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	

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_{BE1} - V_{BE2} is the absolute difference of one transistor compared to the other transistor.

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

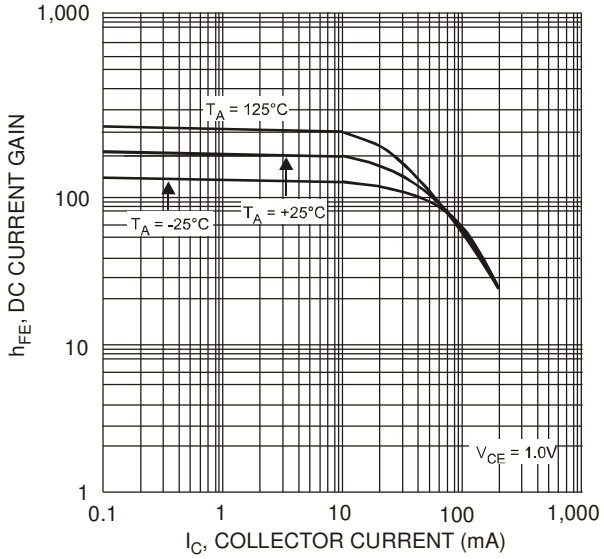


Figure 2. Typical DC Current Gain vs. Collector Current

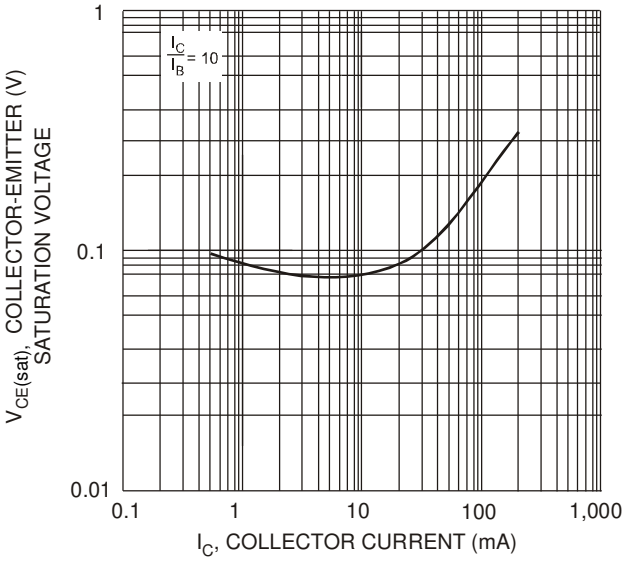


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current

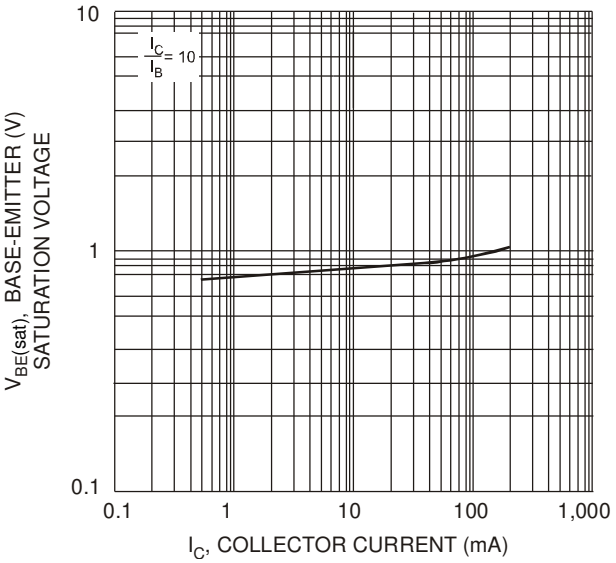


Figure 4. Typical Base-Emitter Saturation Voltage vs. Collector Current

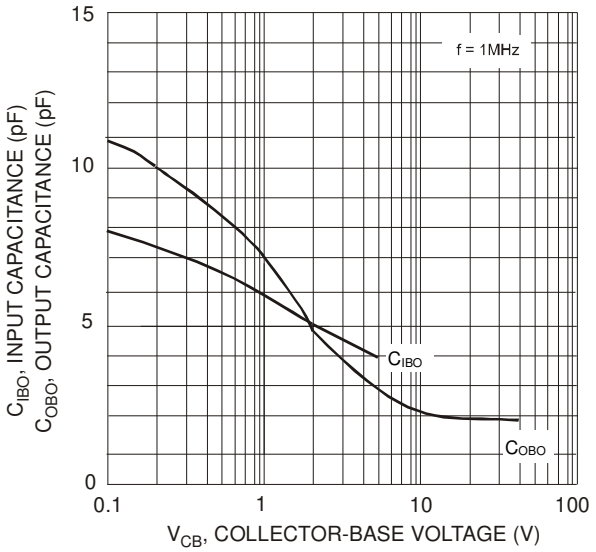


Figure 5. Input and Output Capacitance vs. Collector-Base Voltage

Package Outline Dimensions

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

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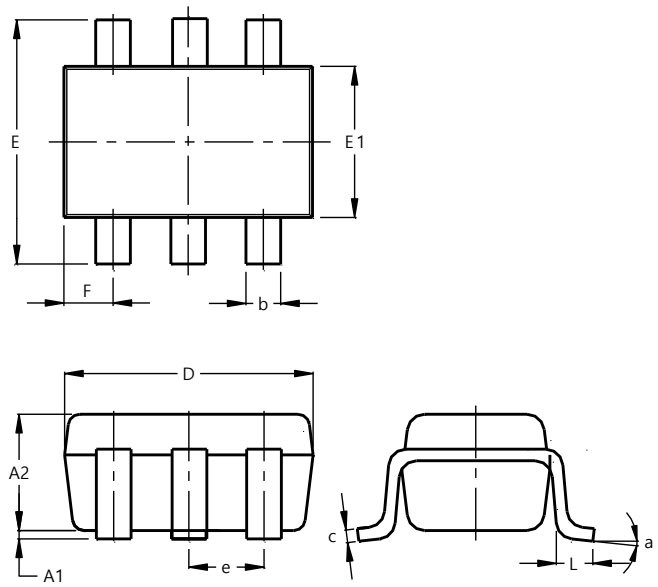

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Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

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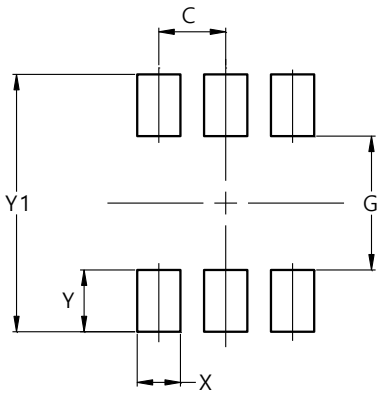

Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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