40V DUAL NPN SMALL-SIGNAL TRANSISTOR IN SOT363

Features

- Epitaxial Planar Die Construction
- Ideal for Medium Power Amplification and Switching
- Ultra-Small Surface-Mount Package
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
  https://www.diodes.com/quality/product-definitions/
- **An automotive-compliant part is available under a separate datasheet (MMDT3904Q).**

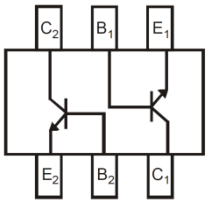
Mechanical Data

- 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)

SOT363



Top View



Device Schematic
Top View

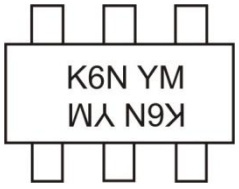
Ordering Information

Orderable Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
MMDT3904-7-F	SOT363	K6N	7	8	3,000	Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. 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.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT363



K6N = Product Type Marking Code
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: N = 2026)
M or $\overline{M}$ = Month (ex: 4 = April)

Date Code Key

Year	2007	-	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Code	U	-	N	P	R	S	T	U	V	W	X	Y

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

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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

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 5 & 6)	P_D	200	mW
Thermal Resistance, Junction to Ambient (Notes 5 & 6)	$R_{\theta JA}$	625	°C/W
Thermal Resistance, Junction to Case (Note 5)	$R_{\theta JC}$	229	°C/W
Operating and Storage and Temperature Range	T_J, T_{STG}	-55 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
Electrostatic Discharge – Charged Device Model	ESD CDM	1,000	V	3C

Notes:
5. For the device mounted on minimum recommended pad layout FR4 PCB of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
6. For a dual device with one active die.
7. Refer to JEDEC specifications JESD22-A114, JESD22-A11 and JS-002.

Thermal Characteristic and Derating Information

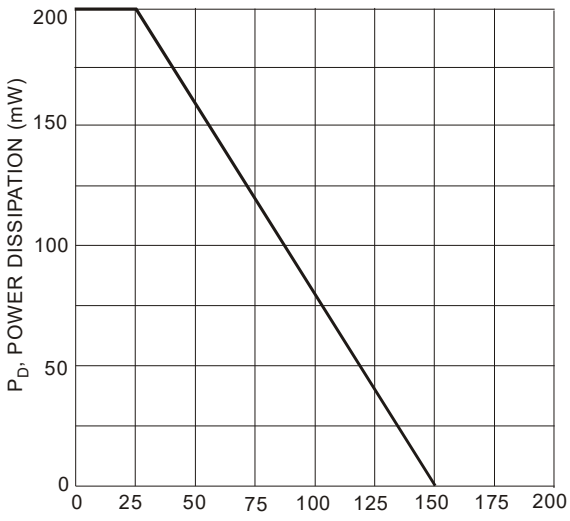


Fig 1. Power Dissipation vs. Ambient Temperature (Total Device)

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	BV_{CBO}	60	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 8)	BV_{CEO}	40	—	V	I_C = 10.0mA
Emitter-Base Breakdown Voltage	BV_{EBO}	6.0	—	V	I_E = 100µA
Collector-Base Cutoff Current	I_{CBO}	—	50	nA	V_{CB} = 50V
Collector-Emitter Cutoff Current	I_{CEV}	—	50 50	nA	V_{CE} = 40V, $V_{BE(off)}$ = 3.0V V_{CE} = 40V, V_{BE} = 0.25V
Emitter-Base Cutoff Current	I_{EBO}	—	50	nA	V_{EB} = 5V
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	$V_{CE(sat)}$	—	0.20 0.30	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	0.65 —	0.85 0.95	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{obo}	—	4.0	pF	V_{CB} = 5.0V, f = 1.0MHz
Input Capacitance	C_{ibo}	—	8.0	pF	V_{EB} = 0.5V, f = 1.0MHz
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	8.0	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, I_{B1} = -I_{B2} = 1.0mA
Rise Time	t_r	—	35	ns	
Storage Time	t_s	—	200	ns	
Fall Time	t_f	—	50	ns	

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

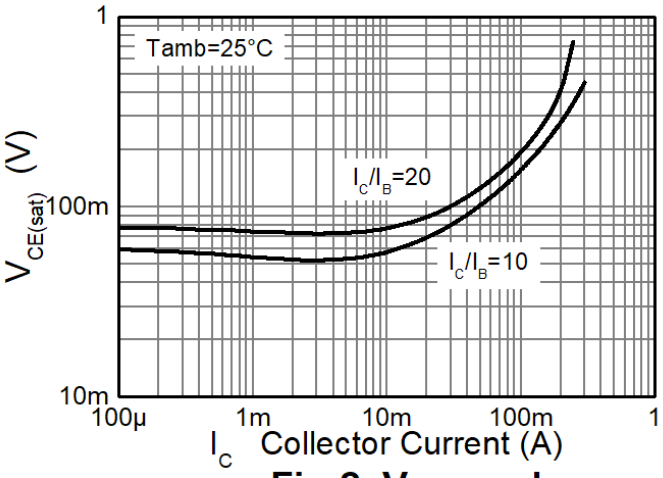


Fig.2. $V_{CE(sat)}$ v I_C

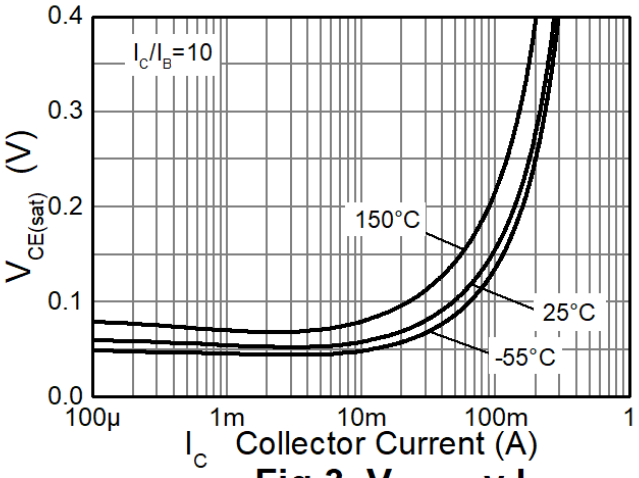


Fig.3. $V_{CE(sat)}$ v I_C

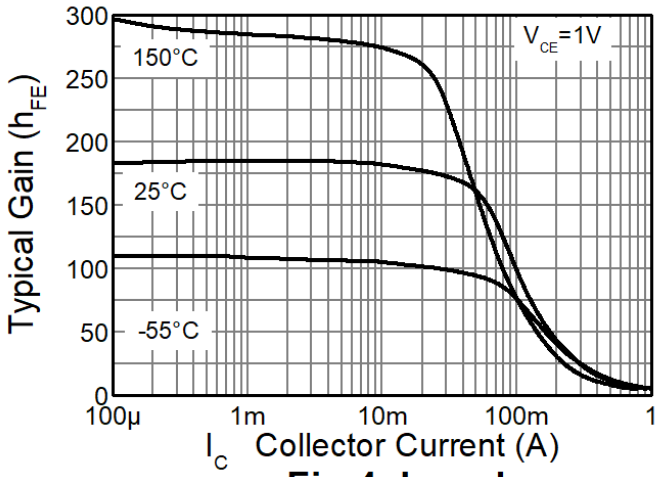


Fig.4. h_{FE} v I_C

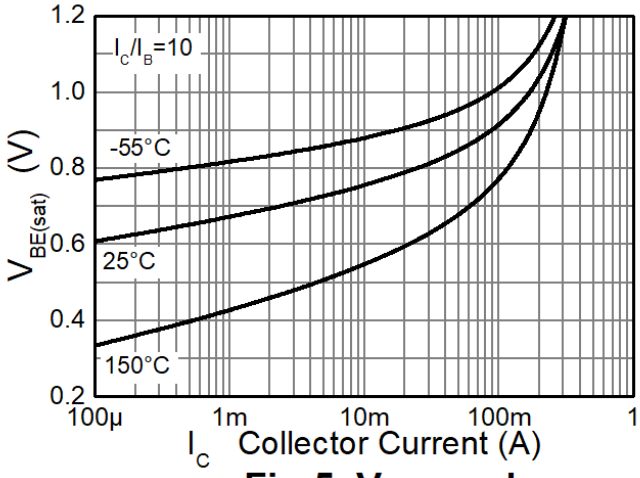


Fig.5. $V_{BE(sat)}$ v I_C

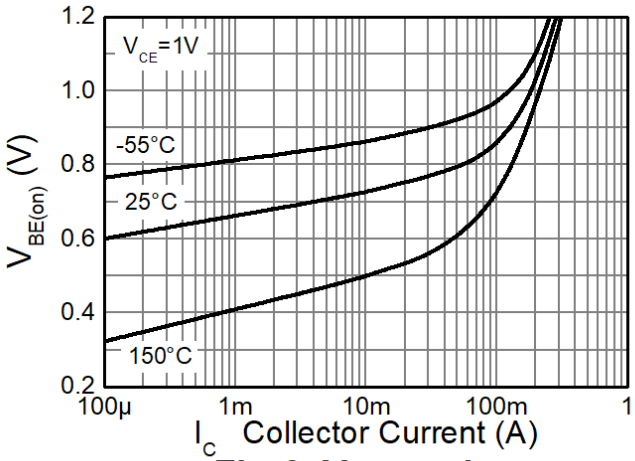


Fig.6. $V_{BE(on)}$ v I_C

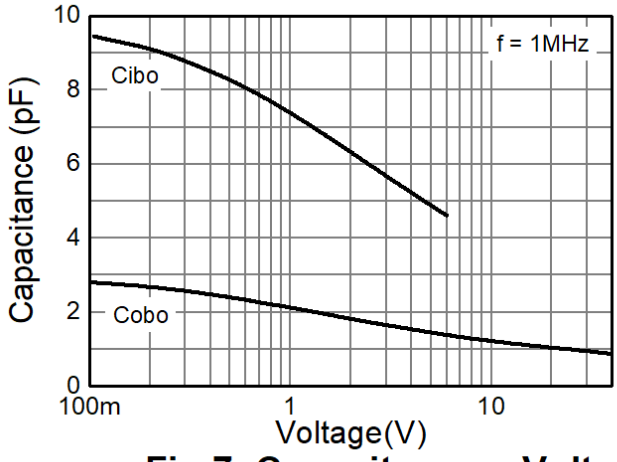


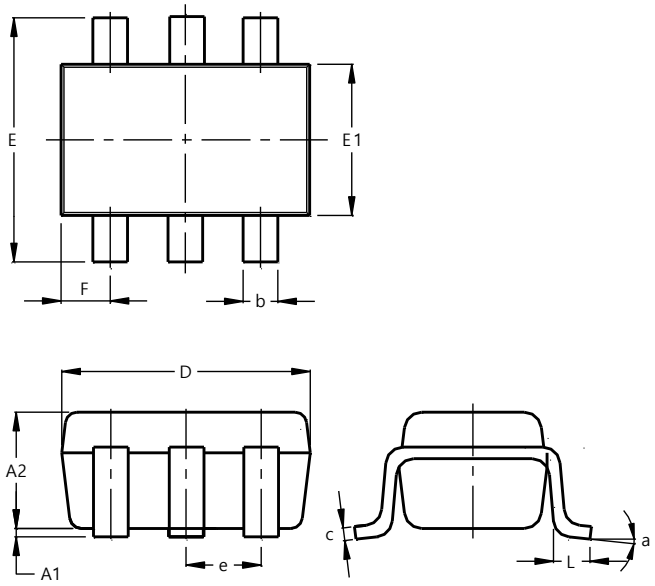
Fig.7. Capacitance v Voltage

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Package Outline Dimensions

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

SOT363

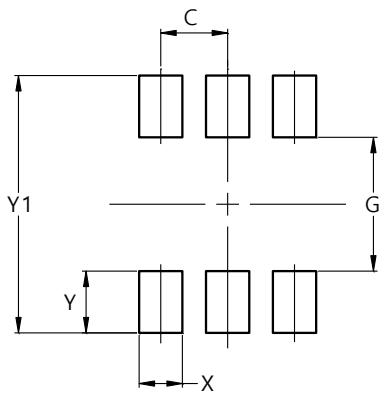


SOT363			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

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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