COMPLEX TRANSISTOR ARRAY FOR BIPOLAR TRANSISTOR HALF H-BRIDGE MOTOR/ACTUATOR DRIVER

Features

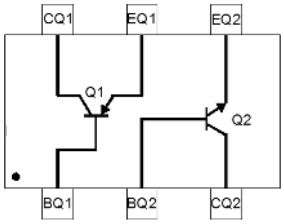
- Epitaxial Planar Die Construction
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

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
- Terminal Connections: See Schematic & Pin Configuration
- Terminals: Finish—Matte Tin Annealed over Alloy 42 Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.016 grams (Approximate)

SOT363

Existing Product
Top View



Device Schematic

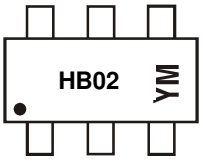
Ordering Information (Note 4)

Part Number	Compliance	Package	Packing	
			Quantity	Carrier
HBDM60V600X-7	Standard	SOT363	3000	Tape & 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



HB02 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: I = 2021)
M = Month (ex: 9 = September)

Date Code Key

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Code	I	J	K	L	M	N	O	P	R	S	T	U

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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Maximum Ratings: Total Device (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Operating and Storage Temperature Range	T_{OP}, T_{STG}	-55 to +150	°C

Thermal Characteristics: Total Device

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\Theta JA}$	625	°C/W

Maximum Ratings: Sub-Component Devices (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Q1-PNP Transistor	Q2-NPN Transistor	Unit
Collector-Base Voltage	V_{CBO}	-60	80	V
Collector-Emitter Voltage	V_{CEO}	-60	65	V
Emitter-Base Voltage	V_{EBO}	-5.5	6	V
Collector Current - Continuous (Note 5)	I_C	-600	500	mA

Electrical Characteristics: PNP Transistor (Q1) (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	-60	—	V	I_C = -10µA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	-60	—	V	I_C = -10mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	-5.5	—	V	I_E = -10µA, I_C = 0
Collector Cutoff Current	I_{CBO}	—	-10	nA	V_{CB} = -50V, I_E = 0
Collector Cutoff Current	I_{CEX}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = 0.5V
Base Cutoff Current	I_{BL}	—	-50	nA	V_{CE} = -30V, $V_{EB(OFF)}$ = -0.5V
ON CHARACTERISTICS (Note 6)					
DC Current Gain	h_{FE}	100 100 100 100 50	— — — 300 —	— — — — —	I_C = -100µA, V_{CE} = -10V I_C = -1.0mA, V_{CE} = -10V I_C = -10mA, V_{CE} = -10V I_C = -150mA, V_{CE} = -10V I_C = -500mA, V_{CE} = -10V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	-0.3 -0.5	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	-0.95 -1.3	V	I_C = -150mA, I_B = -15mA I_C = -500mA, I_B = -50mA

Notes: 5. Device mounted on FR-4 substrate printed circuit board with 1 inch square 2oz copper pad area.
6. Short duration pulse test used to minimize self-heating effect.

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Electrical Characteristics: NPN Transistor (Q2) (@ T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	80	—	—	V	I_C = 100µA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	65	—	—	V	I_C = 1mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	—	—	V	I_E = 100µA, I_C = 0
Collector-Base Cutoff Current	I_{CBO}	—	—	100	nA	V_{CB} = 80V, I_E = 0
Collector Cutoff Current	I_{CES}	—	—	100	nA	V_{CE} = 90V, V_{BE} = 0
Emitter-Base Cutoff Current	I_{EBO}	—	—	100	nA	V_{EB} = 5V, I_C = 0
ON CHARACTERISTICS (Note 6)						
DC Current Gain	h_{FE}	250	—	—	—	V_{CE} = 1V, I_C = 10mA
		100	—	—	—	V_{CE} = 1V, I_C = 100mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	0.2	0.4	V	I_C = 100mA, I_B = 10mA
Base-Emitter Turn-on Voltage	$V_{BE(on)}$	0.7	0.75	0.8	V	V_{CE} = 1V, I_C = 100mA
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	—	—	0.95	V	I_C = 100mA, I_B = 5mA

Note: 6. Short duration pulse test used to minimize self-heating effect.

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

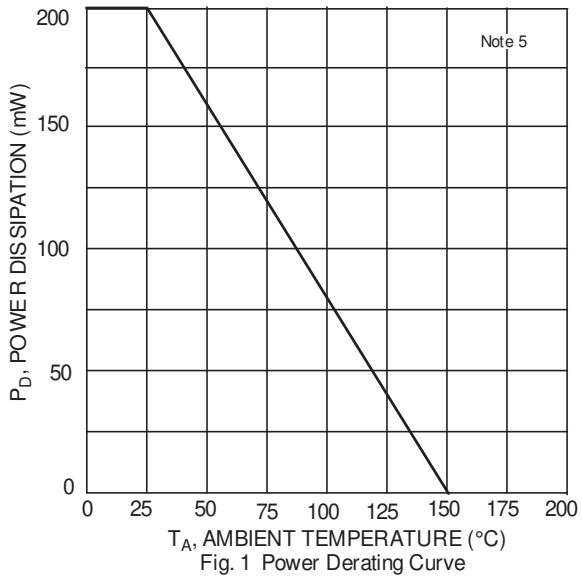

Fig. 1 Power Derating Curve

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PNP Transistor (Q1) Plots

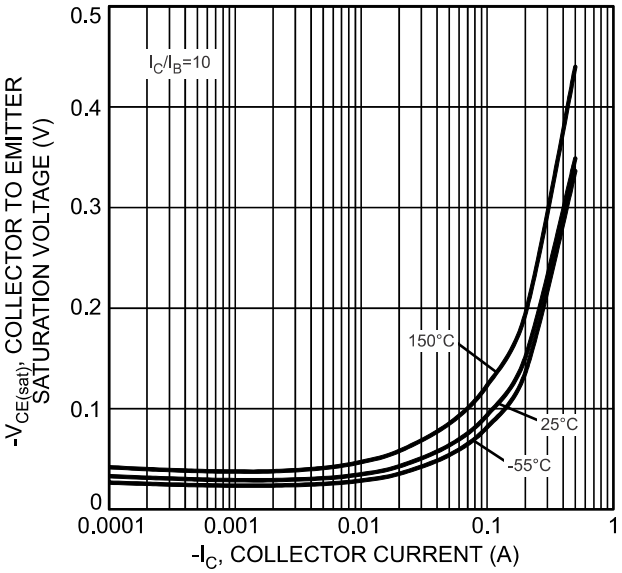

Fig 2. Collector Emitter Saturation Voltage vs. Collector Current

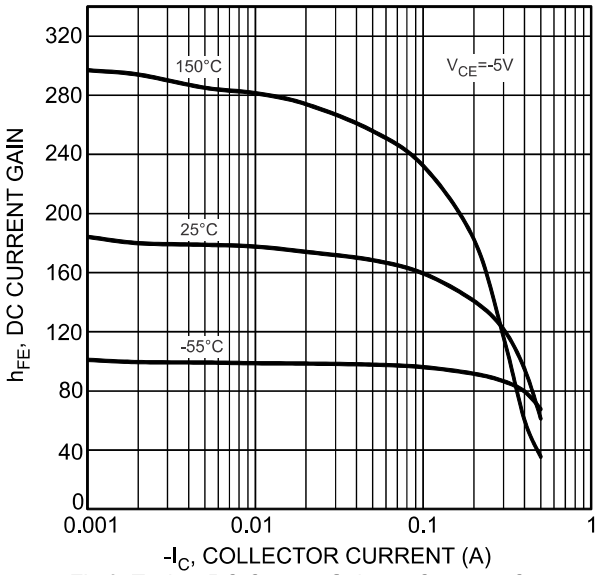

Fig 3. Typical DC Current Gain vs. Collector Current

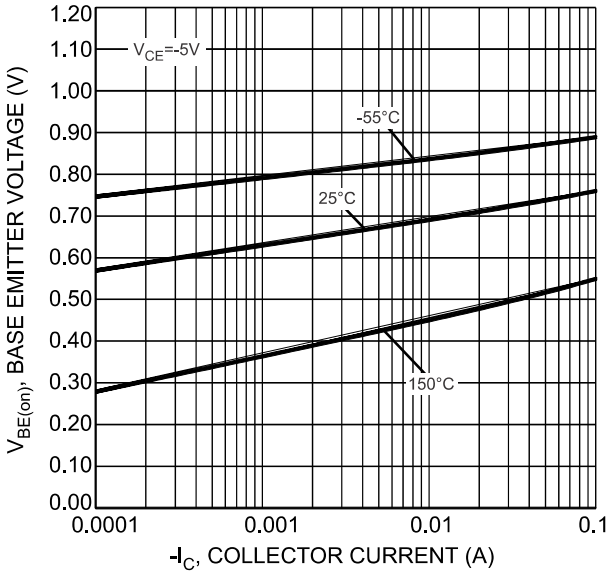

Fig. 4 Typical Base Emitter Voltage vs. Collector Current

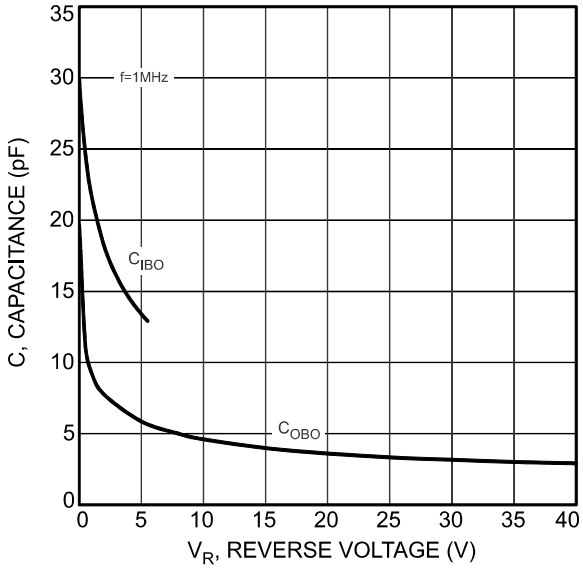

Fig. 5 Typical Capacitance

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NPN Transistor (Q2) Plots

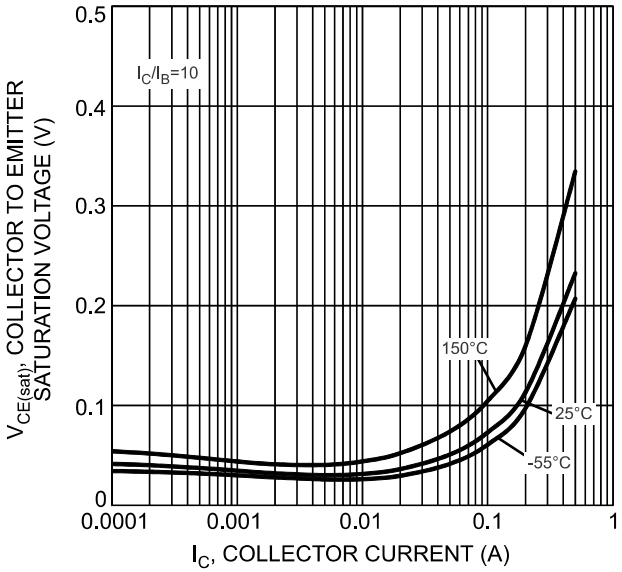

Fig. 6 Typical Collector Emitter Saturation Voltage vs. Collector Current

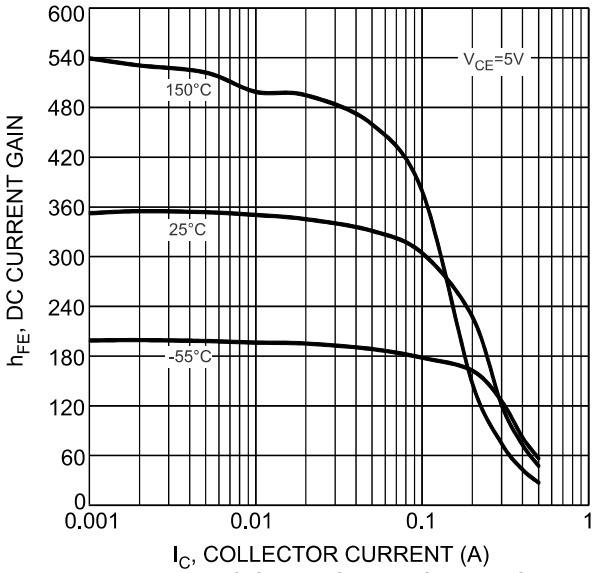

Fig. 7 Typical DC Current Gain vs. Collector Current

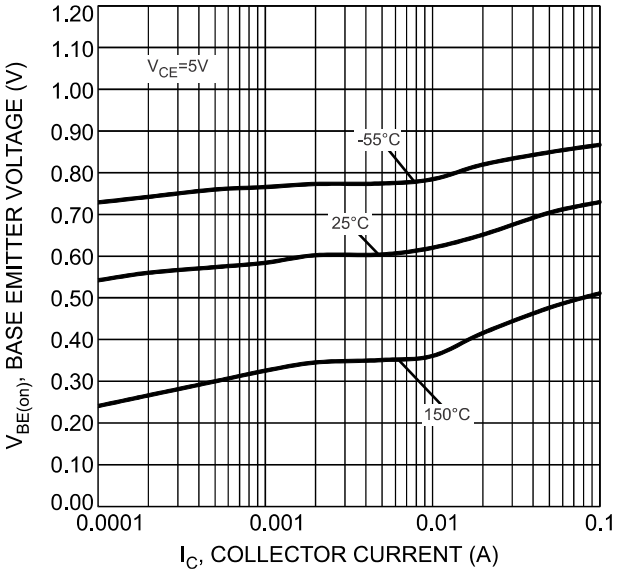

Fig 8. Typical Base Emitter Voltage vs Collector Current

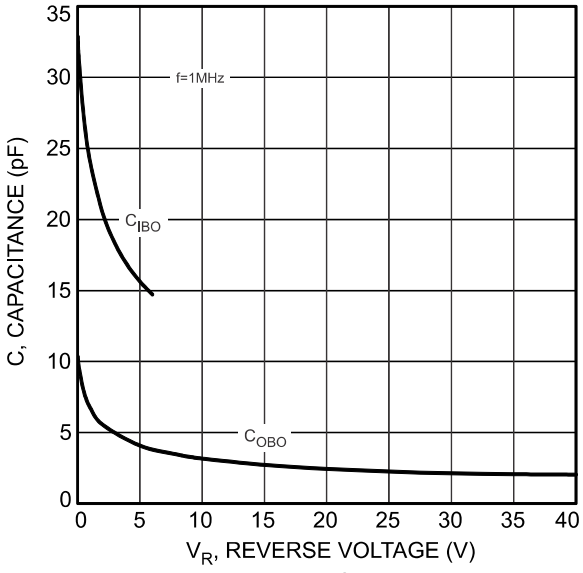

Fig. 9 Typical Capacitance

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Current Schematic with Application Example

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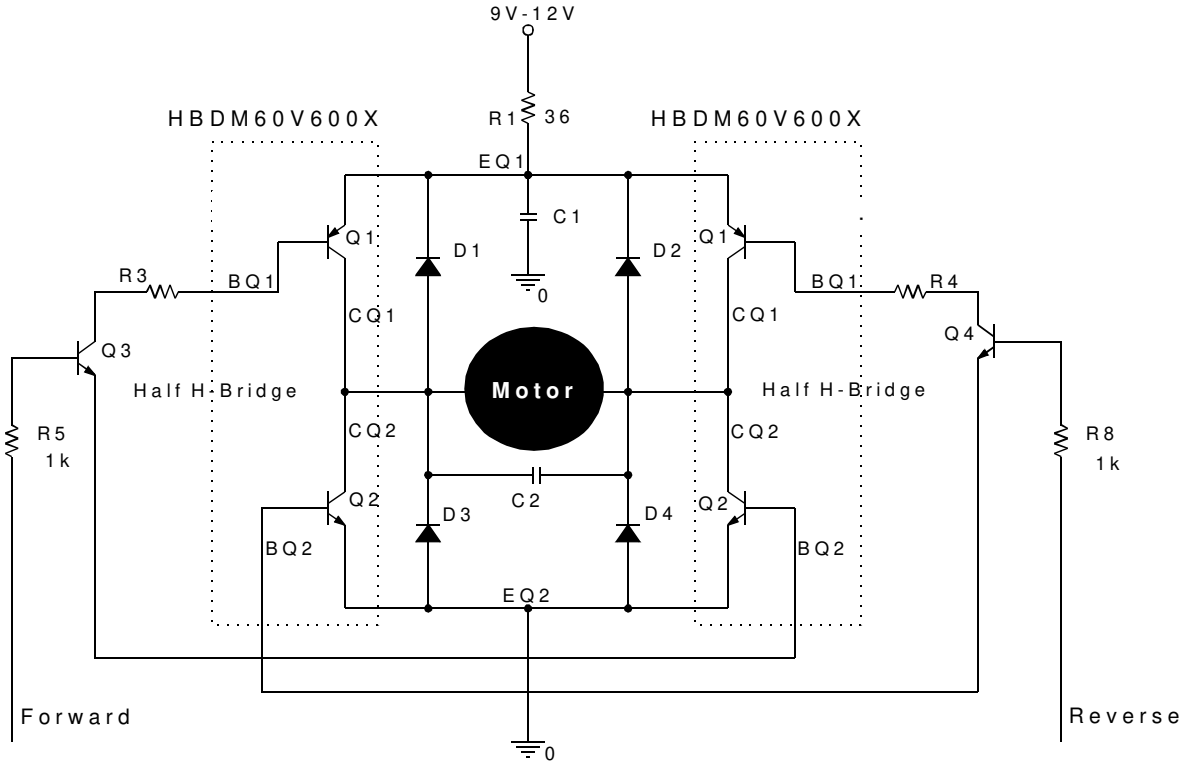

Notes: D1, D2, D3, D4: Switching Diodes (MMBD4448)
Q3, Q4: NPN Transistors (MMBTA06)

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Application Example Schematic (with Package Pinouts)

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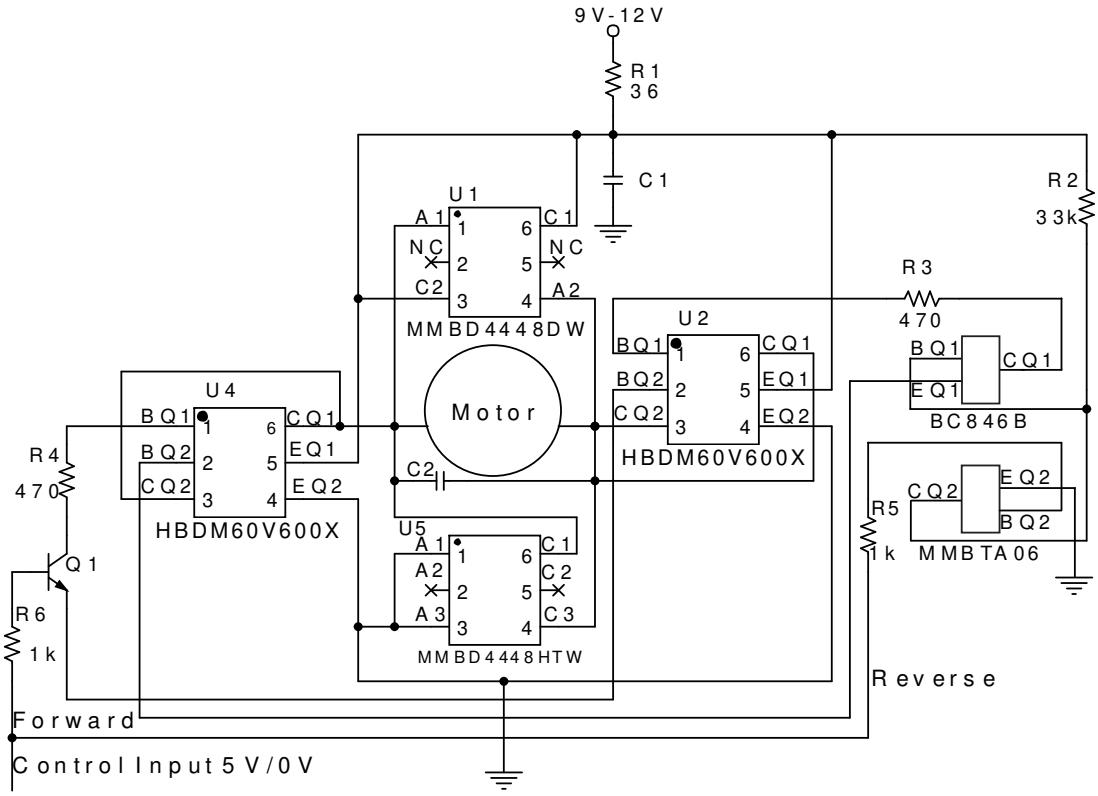

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Package Outline Dimensions

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

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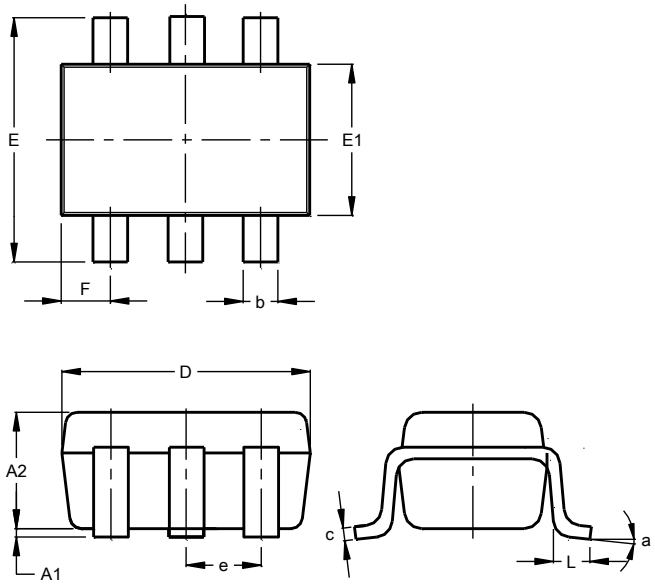

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Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

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

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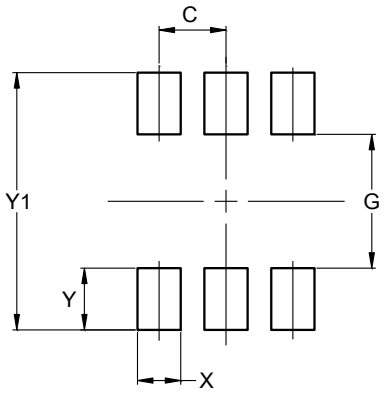

Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500

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