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Lead-free Green

DDC (XXXX) U

NPN PRE-BIASED SMALL SIGNAL DUAL SURFACE MOUNT TRANSISTOR

Features

- Epitaxial Planar Die Construction
- Complementary PNP Types Available (DDA)
- Built-In Biasing Resistors
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The DDC (XXXX) UQs are suitable for automotive applications requiring specific change control; these parts are AEC-Q101 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
  https://www.diodes.com/quality/product-definitions/

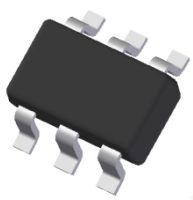
Mechanical Data

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

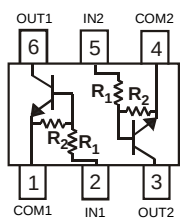
Part Number	R1 (NOM)	R2 (NOM)
DDC124EU	22kΩ	22kΩ
DDC144EU	47kΩ	47kΩ
DDC114YU	10kΩ	47kΩ
DDC123JU	2.2kΩ	47kΩ
DDC114EU	10kΩ	10kΩ
DDC143XU	4.7kΩ	10kΩ
DDC143ZU	4.7kΩ	47kΩ
DDC115EU	100kΩ	100kΩ

Part Number	R1 Only
DDC113TU	1kΩ
DDC143TU	4.7kΩ
DDC114TU	10kΩ

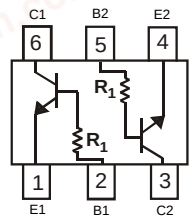
SOT363



Top View



R1, R2



R1 Only

Device Schematic

Ordering Information (Notes 4, 5)

Part Number	Status	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
DDC124EU-7-F	Active	N17	7	8	3,000
DDC124EUQ-7-F	NRND (Use ADC124EUQ)	N17	7	8	3,000
DDC144EU-7-F	Active	N20	7	8	3,000
DDC114YU-7-F	Active	N14	7	8	3,000
DDC114YUQ-7-F	NRND (Use ADC114YUQ)	N14	7	8	3,000
DDC114YUQ-13-F	NRND (Use ADC114YUQ)	N14	13	8	10,000
DDC123JU-7-F	Active	N06	7	8	3,000
DDC114EU-7-F	Active	N13	7	8	3,000
DDC114EUQ-7-F	NRND (Use ADC114EUQ)	N13	7	8	3,000
DDC114EUQ-13-F	NRND (Use ADC114EUQ)	N13	13	8	10,000
DDC113TU-7-F	Active	N01	7	8	3,000
DDC143TU-7-F	Active	N07	7	8	3,000
DDC114TU-7-F	Active	N12	7	8	3,000
DDC114TUQ-7-F	Active	N12	7	8	3,000
DDC143XU-7	Active	N04	7	8	3,000
DDC143XU-13	Active	N04	13	8	10,000
DDC143ZU-7-F	Active	N03	7	8	3,000
DDC115EU-7-F	Active	N02	7	8	3,000

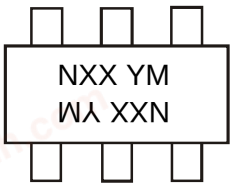
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- 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/.
5. NRND = Not Recommended for New Design.

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Marking Information

SOT363



NXX = Product Type Marking Code (See Ordering Information)
YM = Date Code Marking
Y or $\overline{Y}$ = Year (ex: J = 2022)
M = Month (ex: 9 = September)

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
Supply Voltage		V_O	50	V
Input Voltage	DDC124EU	V_I	-10 to +40	V
	DDC144EU		-10 to +40	
	DDC114YU		-6 to +40	
	DDC123JU		-5 to +12	
	DDC114EU		-10 to +40	
	DDC113TU		-5V max	
	DDC143TU		-5V max	
	DDC114TU		-5V max	
	DDC143XU		-7 to +20	
	DDC143ZU		-5 to +30	
	DDC115EU		-10 to +40	
Output Current	DDC124EU	I_O	30	mA
	DDC144EU		30	
	DDC114YU		70	
	DDC123JU		100	
	DDC114EU		50	
	DDC113TU		100	
	DDC143TU		100	
	DDC114TU		100	
	DDC143XU		100	
	DDC143ZU		100	
	DDC115EU		20	
Peak Output Current		I_{CM}	100	mA

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

Characteristic	Symbol	Value	Unit
Power Dissipation (Notes 6 & 7)	P_D	200	mW
Thermal Resistance, Junction to Ambient Air (Note 6)	$R_{\theta JA}$	625	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes: 6. Mounted on FR-4 PC Board with minimum recommended pad layout.
7. 150mW per element must not be exceeded.

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

For R1 Only Devices: DDC113TU & DDC143TU & DDC114TU

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	50	—	—	V	I_C = 50µA
Collector-Emitter Breakdown Voltage	BV_{CEO}	50	—	—	V	I_C = 1mA
Emitter-Base Breakdown Voltage	BV_{EBO}	5	—	—	V	I_E = 50µA
Collector Cutoff Current	I_{CBO}	—	—	0.5	µA	V_{CB} = 50V
Emitter Cutoff Current	I_{EBO}	—	—	0.5	µA	V_{EB} = 4V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	—	—	0.3	V	I_C/I_B = 2.5mA / 0.25mA DDC143TU I_C/I_B = 1mA / 0.1mA DDC114TU I_C/I_B = 10mA / 1mA DDC113TU
DC Current Transfer Ratio	h_{FE}	100	250	600	—	I_C = 1mA, V_{CE} = 5V
Input Resistor (R_1) Tolerance	ΔR_1	-30	—	+30	%	—
Transition frequency (Note 8)	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = -5mA, f = 100MHz

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

For R1, R2 Devices: DDC124EU& DDC144EU& DDC114YU& DDC123JU& DDC114EU& DDC143ZU& DDC115EU

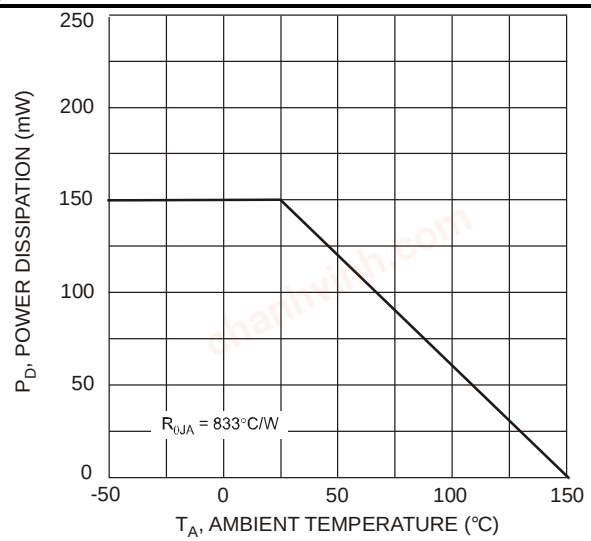
Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	$V_{I(off)}$	0.5 0.5 0.3 0.5 0.5 0.3 0.5 0.5	1.1 1.1 — — 1.1 — — —	—	V	V_{CC} = 5V, I_O = 100µA
	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	$V_{I(on)}$	—	1.9 1.9 — — 1.9 — — —	3.0 3.0 1.4 1.1 3.0 2.5 1.3 3		V_O = 0.3V, I_O = 5mA V_O = 0.3V, I_O = 2mA V_O = 0.3V, I_O = 1mA V_O = 0.3V, I_O = 5mA V_O = 0.3V, I_O = 10mA V_O = 0.3V, I_O = 20mA V_O = 0.3V, I_O = 5mA V_O = 0.3V, I_O = 1mA
Output Voltage	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	$V_{O(on)}$	—	0.1	0.3	V	I_O/I_I = 10mA / 0.5mA I_O/I_I = 10mA / 0.5mA I_O/I_I = 5mA / 0.25mA I_O/I_I = 5mA / 0.25mA I_O/I_I = 10mA / 0.5mA I_O/I_I = 10mA / 0.5mA I_O/I_I = 5mA / 0.25mA I_O/I_I = 10mA / 0.5mA
Input Current	DDC124EU DDC144EU DDC114YU DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	I_I	—	—	0.36 0.18 0.88 3.6 0.88 1.8 1.8 0.15	mA	V_I = 5V
Output Current		$I_{O(off)}$	—	—	0.5	µA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DDC124EU DDC144EU DDC114YU DDC114YUQ DDC123JU DDC114EU DDC143XU DDC143ZU DDC115EU	G_I	56 68 68 80 80 30 30 80 82	—	—	—	V_O = 5V, I_O = 5mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 10mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 10mA V_O = 5V, I_O = 5mA V_O = 5V, I_O = 10mA V_O = 5V, I_O = 10mA V_O = 5V, I_O = 5mA
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		$\Delta(R_2/R_1)$	-20	—	+20	%	—
Transition frequency (Note 8)		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = 5mA, f = 100MHz

Note: 8. Transistor - for reference only.

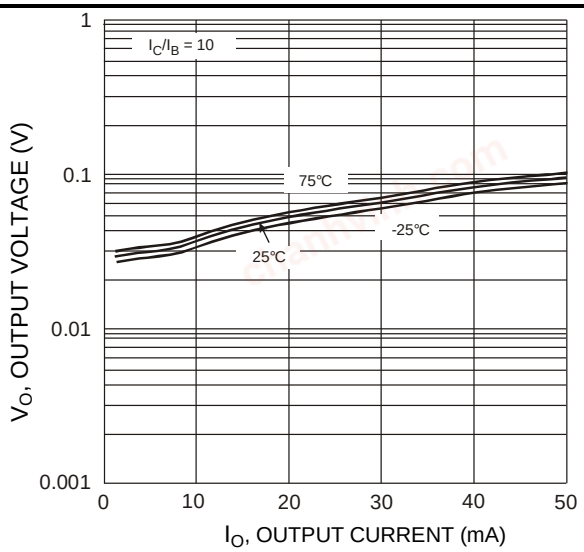
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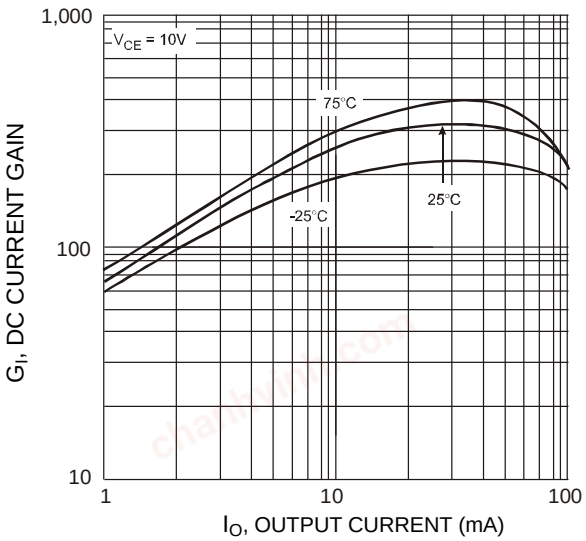
Typical Curves – DDC123JU (@ T_A = +25°C, unless otherwise specified.)



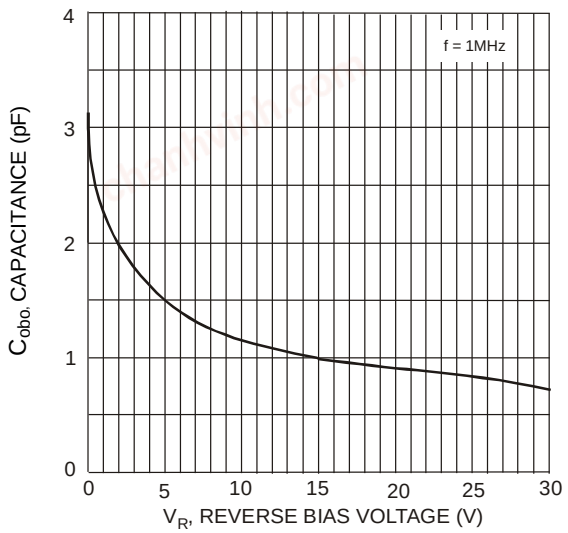
P_D v T_A



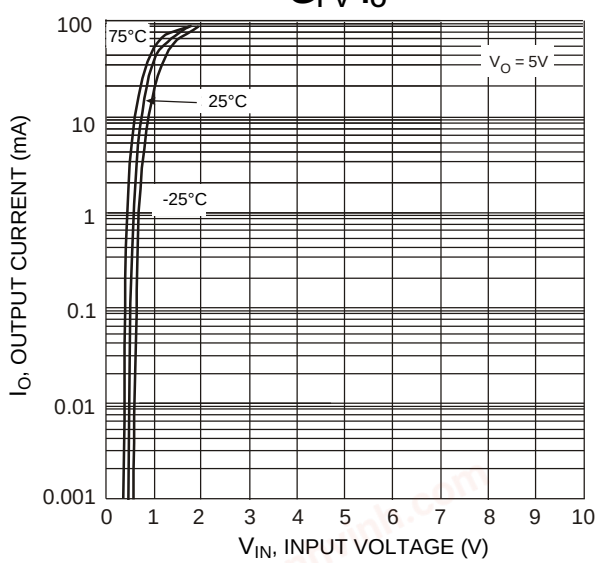
V_O v I_O



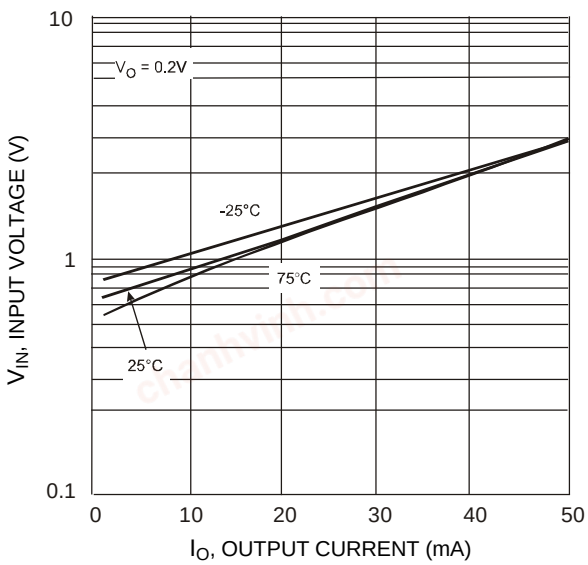
G_I v I_O



C_{obo} v V_R



I_O v V_{IN}

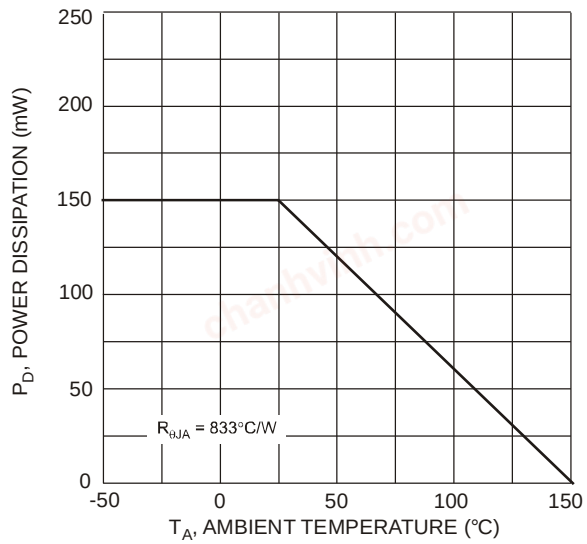


V_{IN} v I_O

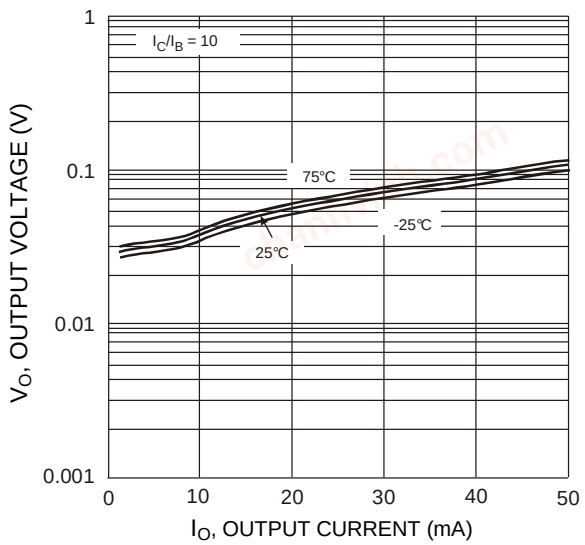
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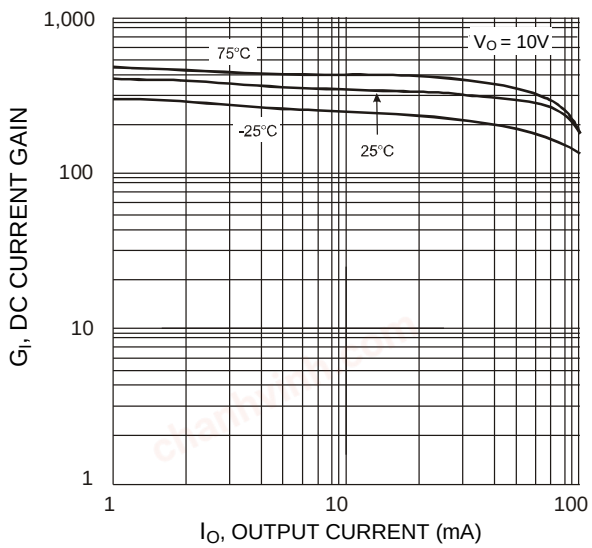
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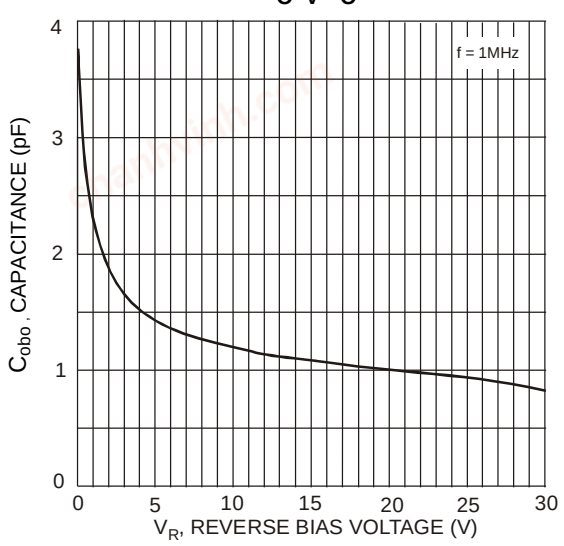
P_D v T_A



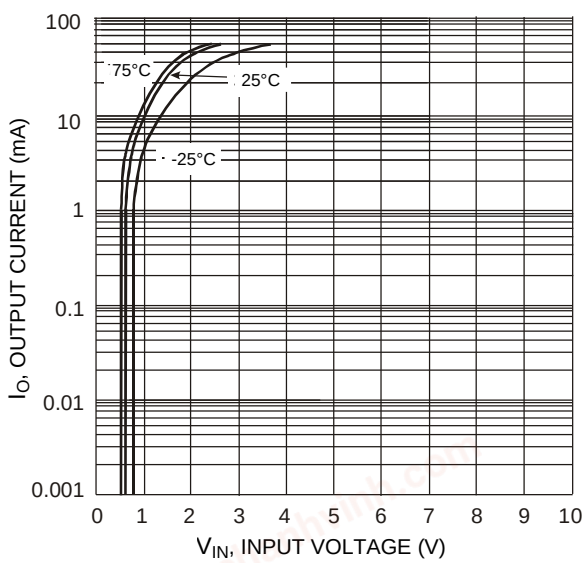
V_O v I_O



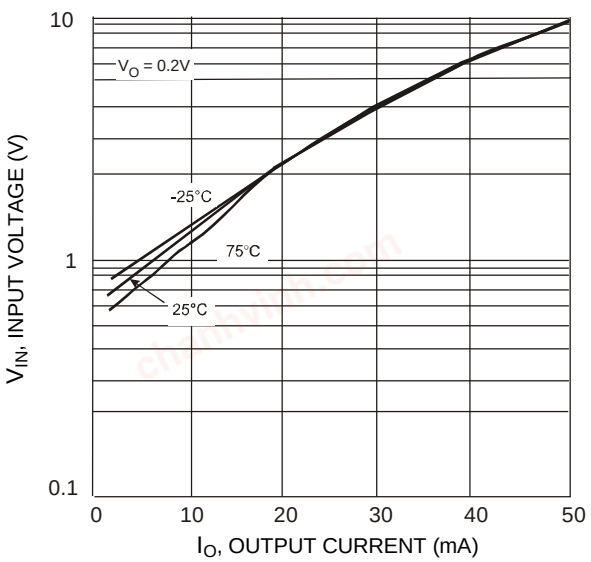
G_I v I_O



C_{obo} v V_R



I_O v V_{IN}

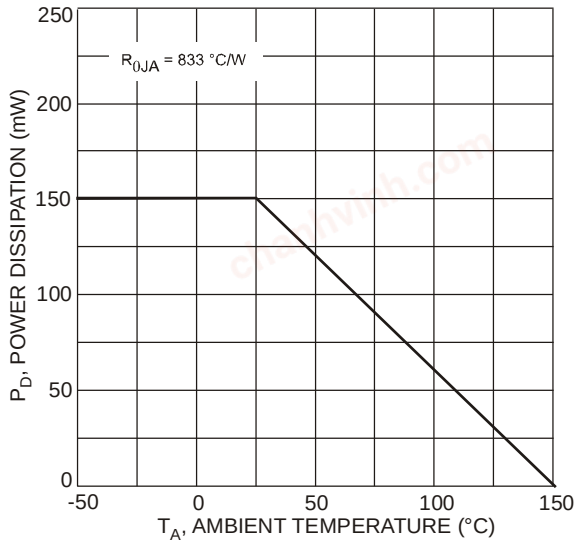


V_{IN} v I_O

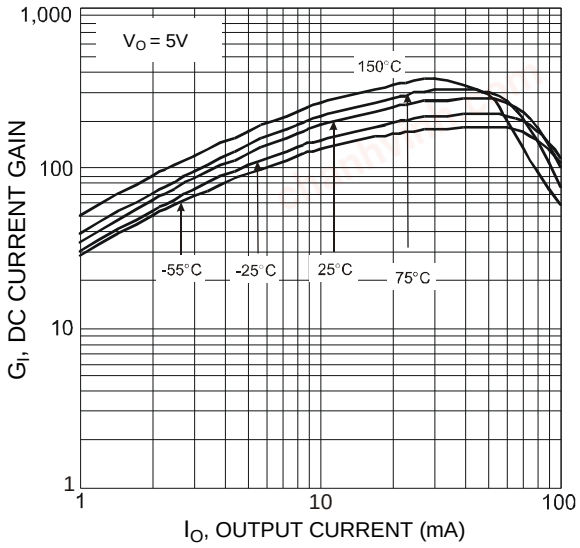
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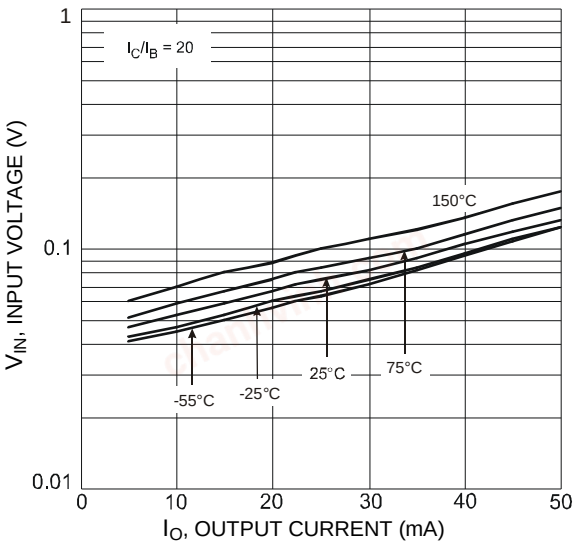
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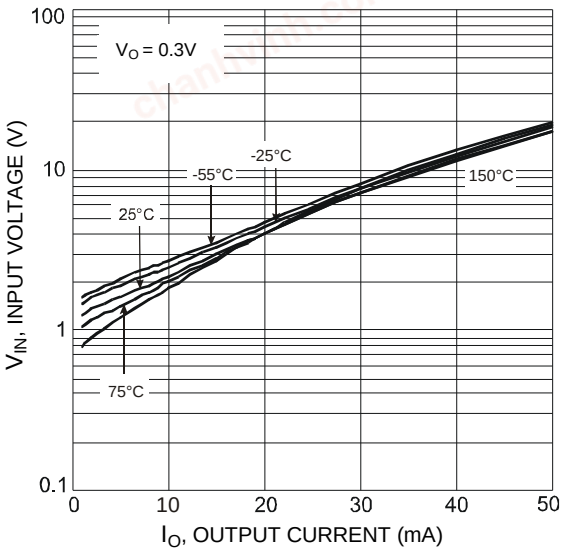
P_D v T_A



G_I v I_O



V_{IN} v I_O



V_{IN} v I_O

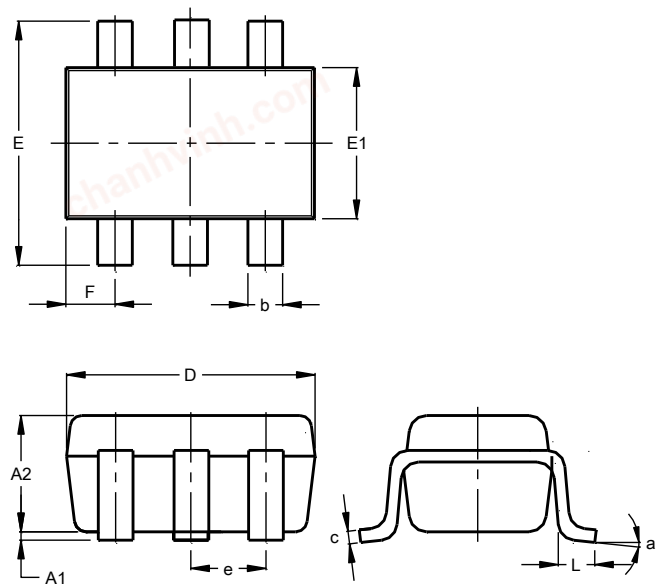
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Package Outline Dimensions

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

SOT363

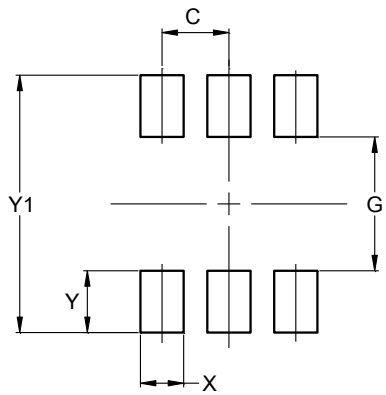


SOT363			
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

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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