

DTC114YE-Q1 / DTC114YUA-Q1 DTC114YCA-Q1

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NPN Silicon Surface Mount Transistors With Monolithic Bias Resistor Net-Work

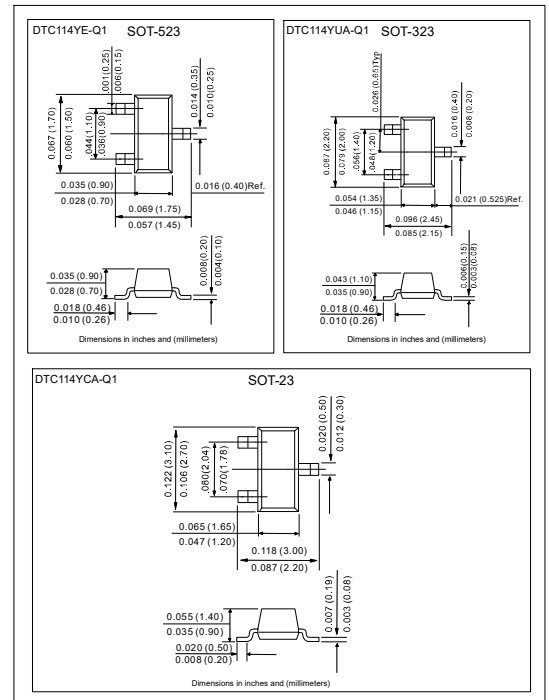
Features

- Built-in bias resistors enable the configuration of an inverter circuit without connecting external input resistors(see equivalent circuit).
- The bias resistors consist of thin-film resistors with complete isolation to allow negative biasing of the input. They also have the advantage of almost completely eliminating parasitic effects.
- Only the on/off conditions need to be set for operation, making device design easy.
- Qualified to AEC-Q101 standards for high reliability.
- Lead-free parts meet RoHS requirements.
- Suffix "-H" indicates Halogen-free part, ex. DTC114YE-Q1-H.

Mechanical data

- Epoxy:UL94-V0 rated flame retardant.
- Case : Molded plastic, SOT-523, SOT-323, SOT-23.
- Terminals : Solder plated, solderable per MIL-STD-750, Method 2026.
- Mounting Position : Any.

Package Outline



Maximum ratings (At $T_A=25^{\circ}\text{C}$ unless otherwise noted)

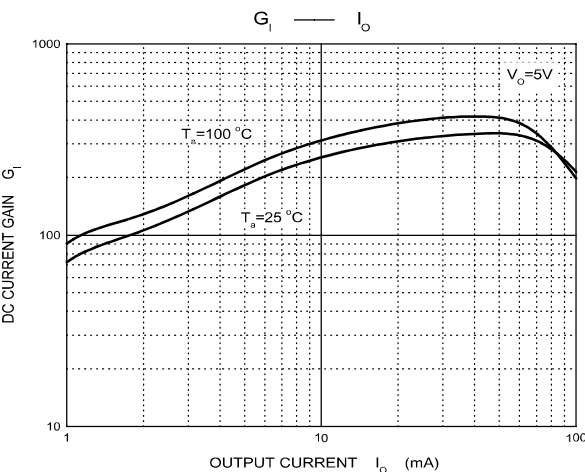
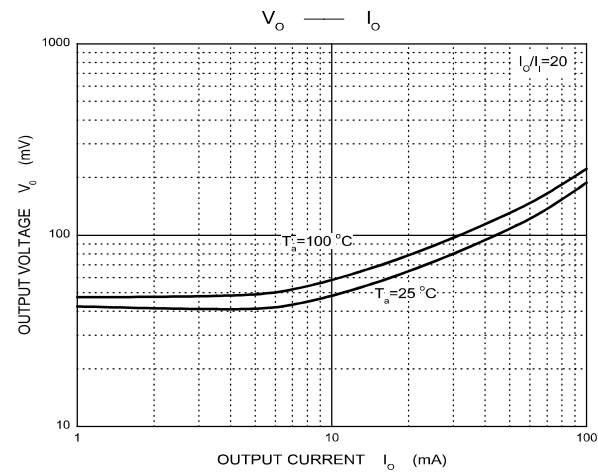
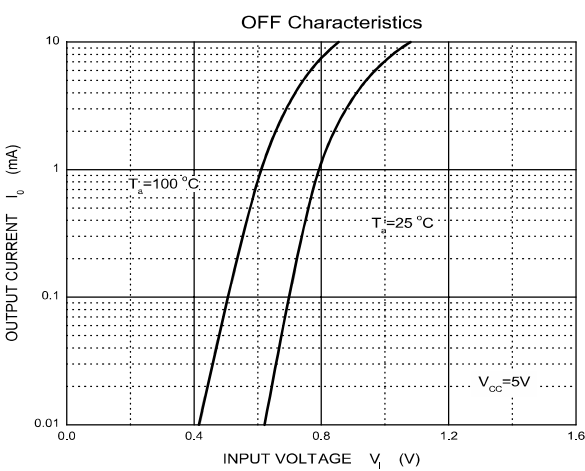
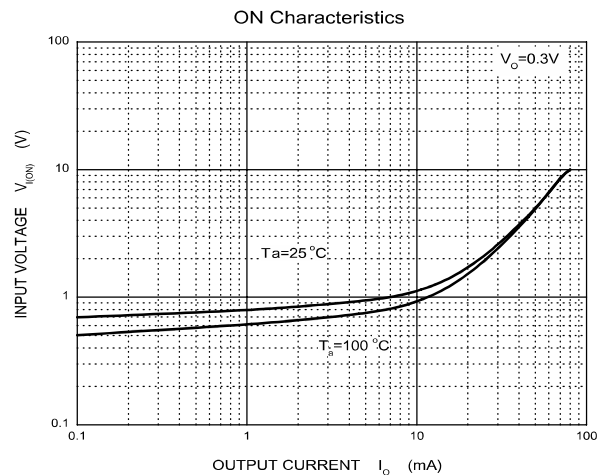
Parameter	Symbol	Limits			Unit
		DTC114YE-Q1	DTC114YUA-Q1	DTC114YCA-Q1	
Supply voltage	V _{CC}	50			V
Input voltage	V _{IN}	-6 ~ +40			V
Output current	I _O	70			mA
Peak collector current	I _{CM}	100			mA
Power dissipation	P _D	150	200		mW
Operation junction temperature range	T _J	-55 to +150			°C
Storage temperature range	T _{stg}	-55 to +150			°C

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Electrical characteristics (At $T_A=25^{\circ}\text{C}$ unless otherwise noted)

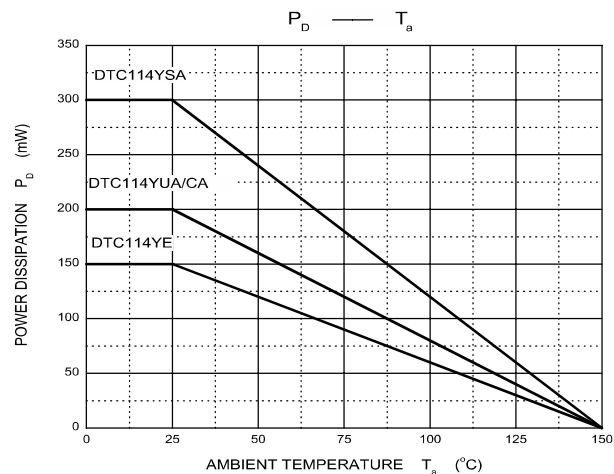
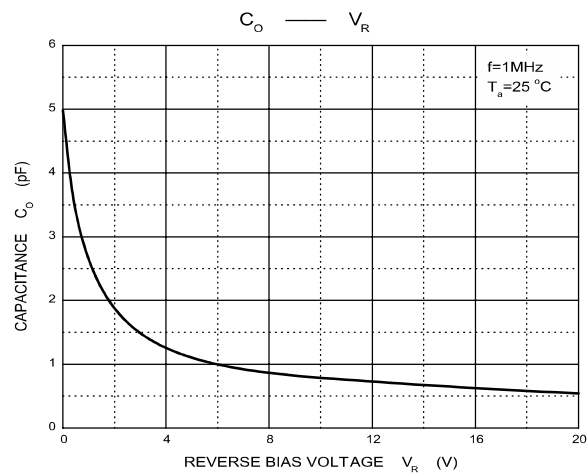
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input voltage	$V_{I(off)}$	$V_{CC} = 5\text{V}, I_o = 100\mu\text{A}$			0.3	V
	$V_{IN(on)}$	$V_o = 0.3\text{V}, I_o = 1\text{mA}$	1.4			
Output voltage	V_{IN}	$I_o / I_i = 5\text{mA} / 250\mu\text{A}$			0.3	V
Input current	I_o	$V_i = 5\text{V}$			0.88	mA
Output current	$I_{O(off)}$	$V_{CC} = 50\text{V}, V_i = 0$			0.5	μA
DC current gain	G_I	$V_o = 5\text{V}, I_o = 5\text{mA}$	68			
Input resistance	R_1		7	10	13	$\text{k}\Omega$
Resistance ratio	R_2 / R_1		3.7	4.7	5.7	
Transition frequency	f_T	$V_o = 10\text{V}, I_o = 5\text{mA}, f = 100\text{MHz}$		250		MHz

Rating and characteristic curves



DTC114YE-Q1 / DTC114YUA-Q1
DTC114YCA-Q1

Rating and characteristic curves



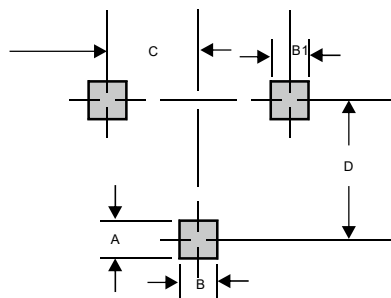
Pinning information

Pin	Simplified outline	Symbol
Pin 1 IN Pin 2 GND Pin 3 OUT		

Marking

Type number	Marking code
DTC114YE-Q1	64
DTC114YUA-Q1	64
DTC114YCA-Q1	64

Suggested solder pad layout



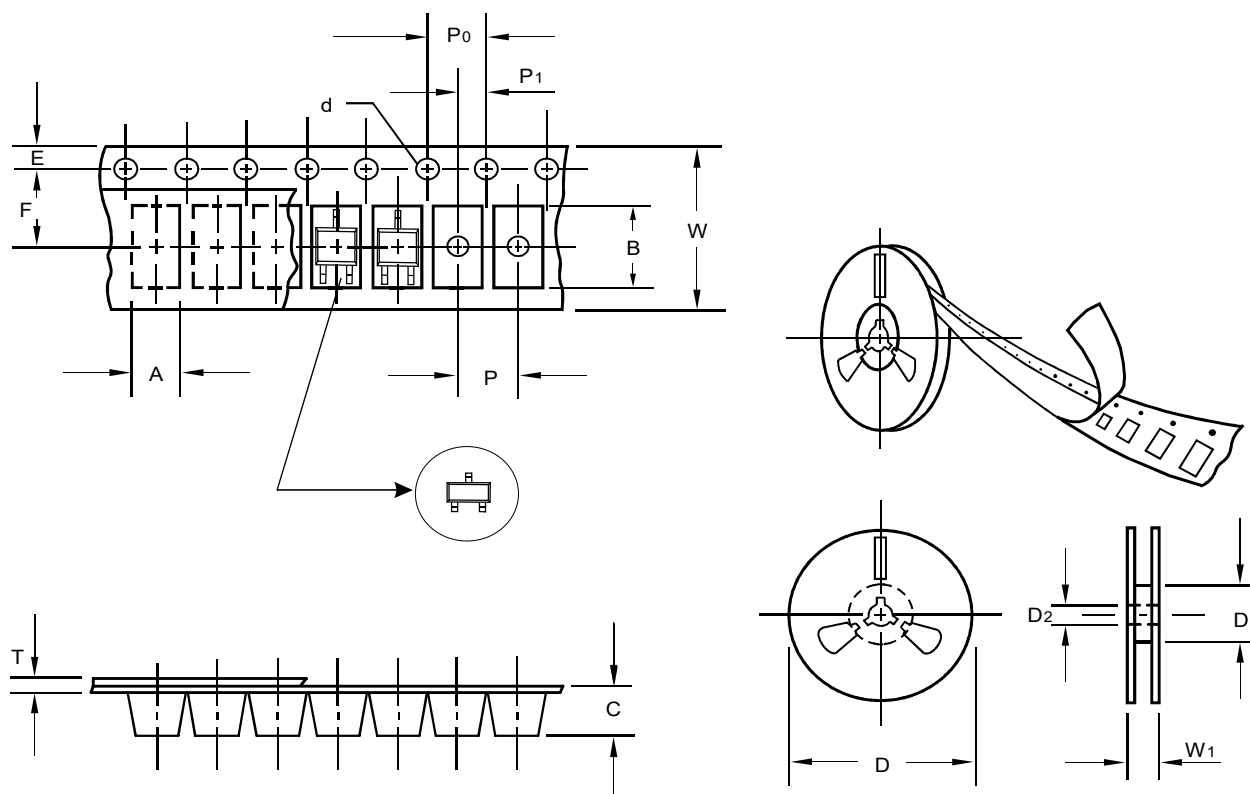
Dimensions in inches and (millimeters)

Package	A	B	B1	C	D
SOT-523	0.024(0.60)	0.020(0.50)	0.016(0.40)	0.020(0.50)	0.049(1.24)
SOT-323	0.032(0.80)	0.020(0.50)	-	0.025(0.65)	0.087(2.20)
SOT-23	0.035(0.90)	0.031(0.80)	-	0.037(0.95)	0.079(2.00)

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Packing information



unit:mm

Item	Symbol	Tolerance	SOT-523	SOT-323	SOT-23
Carrier width	A	0.1	1.85	2.25	3.15
Carrier length	B	0.1	1.85	2.55	2.77
Carrier depth	C	0.1	0.875	1.19	1.22
Sprocket hole	d	0.1	1.50	1.50	1.50
13" Reel outside diameter	D	2.0	-	-	-
13" Reel inner diameter	D1	min	-	-	-
7" Reel outside diameter	D	2.0	178.00	178.00	178.00
7" Reel inner diameter	D1	min	54.40	54.40	54.40
Feed hole diameter	D2	0.5	13.00	13.00	13.00
Sprocket hole position	E	0.1	1.75	1.75	1.75
Punch hole position	F	0.1	3.50	3.50	3.50
Punch hole pitch	P	0.1	4.00	4.00	4.00
Sprocket hole pitch	P0	0.1	4.00	4.00	4.00
Embossment center	P1	0.1	2.00	2.00	2.00
Overall tape thickness	T	0.1	0.23	0.23	0.23
Tape width	W	0.3	8.00	8.00	8.00
Reel width	W1	1.0	11.4	11.4	11.4

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

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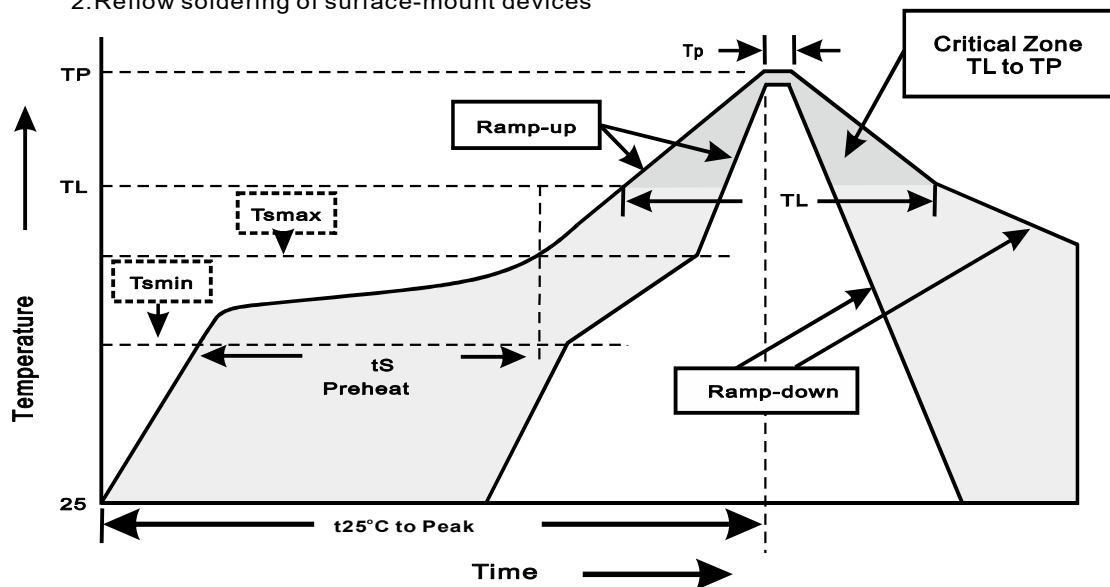
DTC114YCA-Q1

Reel packing

PACKAGE	REEL SIZE	REEL (pcs)	COMPONENT SPACING (m/m)	BOX (pcs)	INNER BOX (m/m)	REEL DIA, (m/m)	CARTON SIZE (m/m)	CARTON (pcs)	APPROX. GROSS WEIGHT (kg)
SOT-523	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6
SOT-323	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	9.5
SOT-23	7"	3,000	4.0	30,000	183*123*183	178	382*257*387	240,000	11.6

Suggested thermal profiles for soldering processes

- 1.Storage environment: Temperature=5°C~40°C Humidity=55%±25%
- 2.Reflow soldering of surface-mount devices



- 3.Reflow soldering

Profile Feature	Soldering Condition
Average ramp-up rate(T _L to T _P)	<3°C/sec
Preheat -Temperature Min(T _{Smin}) -Temperature Max(T _{Smax}) -Time(min to max)(t _S)	150°C 200°C 60~120sec
T _{Smax} to T _L -Ramp-upRate	<3°C/sec
Time maintained above: -Temperature(T _L) -Time(t _L)	217°C 60~260sec
Peak Temperature(T _P)	255°C-0/+5°C
Time within 5°C of actual Peak Temperature(t _P)	10~30sec
Ramp-down Rate	<6°C/sec
Time 25°C to Peak Temperature	<6minutes

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High reliability test capabilities

Item Test	Conditions
1. Steady State Operating Life	$P_D = P_{Dmax}$ Test Duration: 1000hrs
2. High Temperature Reverse Bias	$T_J = 150^{\circ}\text{C}$, $V_{CE} = 80\%$ related volage, 1000hrs
3. Temperature Cycle	-55°C (15min) to 150°C (15min) Air to Air Transition Time < 20sec Test Cycles: 1000cycle
4. Autoclave	$P = 2\text{atm}$ $T_a = 121^{\circ}\text{C}$ $RH = 100\%$ Test Duration: 96hrs
5. High Temperature Storage Life	$T_a = 150^{\circ}\text{C}$ Test Duration: 1000hrs
6. Solderability	245°C , 5sec
7. High Temperature High Humidity Reverse Bias	$T_a = 85^{\circ}\text{C}$, 85%RH, $V_{CE} = 80\%$ related volage, 1000hrs
8. Resistance to Soldering Heat	260°C , 10sec
10. Solvent Resistance	