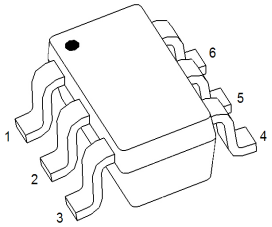
Plastic-Encapsulate Transistors

DUAL TRANSISTOR (PNP+NPN)

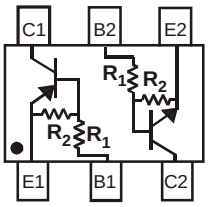
SOT-23 -6L



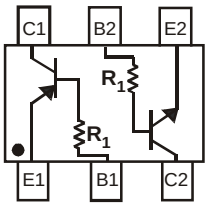
Features

- Epitaxial Planar Die Construction
- Built-In Biasing Resistors
- **Available in Lead Free/RoHS Compliant Version (Note 1)**
- **"Green" Device (Note 2)**

Part Number	R1	R2	Marking
DCX124EK	22KΩ	22KΩ	C17
DCX144EK	47KΩ	47KΩ	C20
DCX114YK	10KΩ	47KΩ	C14
DCX123JK	2.2KΩ	47KΩ	C06
DCX114EK	10KΩ	10KΩ	C13
DCX115EK	100KΩ	100KΩ	C15
DCX143TK	4.7KΩ	-	C07
DCX114TK	10KΩ	-	C12



R1, R2 Device Schematic



R1 only Device Schematic

Maximum Ratings NPN Section @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Supply Voltage		V_{CC}	50	V
Input Voltage	DCX124EK	V_{IN}	-10 to +40	V
	DCX144EK		-10 to +40	
	DCX114YK		-6 to +40	
	DCX123JK		-5 to +12	
	DCX114EK		-10 to +40	
	DCX115EK		-10 to +40	
	DCX143TK		-5V max	
	DCX114TK		-5V max	
Output Current	DCX124EK	I_O	30	mA
	DCX144EK		30	
	DCX114YK		70	
	DCX123JK		100	
	DCX114EK		50	
	DCX115EK		20	
	DCX143TK		100	
	DCX114TK		100	
Output Current	All	$I_{C(MAX)}$	100	mA

Thermal Characteristics NPN Section

Characteristic	Symbol	Value	Unit
Power Dissipation (Total) (Note 3)	P_D	300	mW
Thermal Resistance, Junction to Ambient Air (Note 3)	$R_{\theta JA}$	417	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
1. No purposefully added lead.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com/products/lead_free/index.php.
3. Mounted on FR4 PC Board with. 200mW per element must not be exceeded.

Maximum Ratings PNP Section @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Supply Voltage		V_{CC}	50	V
Input Voltage	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK DCX143TK DCX114TK	V_{IN}	+10 to –40 +10 to –40 +6 to –40 +5 to –12 +10 to –40 +10 to –40 +5V max +5V max	V
Output Current	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK DCX143TK DCX114TK	I_O	-30 -30 -70 -100 -50 -20 -100 -100	mA
Output Current	All	$I_{C(MAX)}$	-100	mA

Thermal Characteristics PNP Section

Characteristic		Symbol	Value	Unit
Power Dissipation (Total)	(Note 3)	P_D	300	mW
Thermal Resistance, Junction to Ambient Air	(Note 3)	$R_{\theta JA}$	833	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics NPN Section @T_A = 25°C unless otherwise specified

Characteristic (DCX143TK & DCX114TK only)	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 – DCX143TK I_C/I_B = 1mA / 0.1mA – DCX114TK
DC Current Transfer Ratio	h_{FE}	100	250	600	—	I_C = 1mA, V_{CE} = 5V
Input Resistor (R_1) Tolerance	ΔR_1	-30	—	+30	%	—
Gain-Bandwidth Product*	f_T	—	250	—	MHz	V_{CE} = 10V, I_E = -5mA, f = 100MHz

* Transistor - For Reference Only

Electrical Characteristics NPN Section (continued) @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EK	$V_{I(OFF)}$	0.5	1.1	—	V	V_{CC} = 5V, I_O = 100μA
	DCX144EK		0.5	1.1			
	DCX114YK		0.3	—			
	DCX123JK		0.5	—			
	DCX114EK		0.5	1.1			
	DCX115EK		0.5	1.1			
	DCX124EK	$V_{I(ON)}$	—	1.65	3.0	V	V_O = 0.3V, I_O = 5mA
	DCX144EK			1.9	3.0		V_O = 0.3V, I_O = 2mA
	DCX114YK			—	1.4		V_O = 0.3V, I_O = 1mA
	DCX123JK			—	1.1		V_O = 0.3V, I_O = 5mA
	DCX114EK			1.9	3.0		V_O = 0.3V, I_O = 10mA
	DCX115EK			1.9	3.0		V_O = 0.3V, I_O = 1mA
Output Voltage	DCX124EK	$V_{O(ON)}$	—	0.1	0.3	V	I_O/I_I = 10mA / 0.5mA
	DCX144EK						I_O/I_I = 10mA / 0.5mA
	DCX114YK						I_O/I_I = 5mA / 0.25mA
	DCX123JK						I_O/I_I = 5mA / 0.25mA
	DCX114EK						I_O/I_I = 10mA / 0.5mA
	DCX115EK						I_O/I_I = 5mA / 0.25mA
Input Current	DCX124EK	I_I	—	—	0.36	mA	V_I = 5V
	DCX144EK				0.18		
	DCX114YK				0.88		
	DCX123JK				3.6		
	DCX114EK				0.88		
	DCX115EK				0.15		
Output Current		$I_{O(OFF)}$	—	—	0.5	μA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DCX124EK	G_I	80	—	—	—	V_O = 5V, I_O = 5mA
	DCX144EK		68				V_O = 5V, I_O = 5mA
	DCX114YK		68				V_O = 5V, I_O = 10mA
	DCX123JK		80				V_O = 5V, I_O = 10mA
	DCX114EK		30				V_O = 5V, I_O = 5mA
	DCX115EK		82				V_O = 5V, I_O = 5mA
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		R_2/R_1	-20	—	+20	%	—
Gain-Bandwidth Product*		f_T	—	250	—	MHz	V_{CE} = 10V, I_E = -5mA, f = 100MHz

* Transistor - For Reference Only

Electrical Characteristics PNP Section @T_A = 25°C unless otherwise specified

Characteristic (DCX143TK & DCX114TK only)	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 - DCX143TK I_C/I_B = -1mA / -0.1mA - DCX114TK
DC Current Transfer Ratio	h_{FE}	100	250	600	—	I_C = -1mA, V_{CE} = -5V
Input Resistor (R_1) Tolerance	ΔR_1	-30	—	+30	%	—
Gain-Bandwidth Product*	f_T	—	250	—	MHz	V_{CE} = -10V, I_E = 5mA, f = 100MHz

* Transistor - For Reference Only

Electrical Characteristics PNP Section (Continued) @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Input Voltage	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK	$V_{I(OFF)}$	-0.5 -0.5 -0.3 -0.5 -0.5 -0.5	-1.1 -1.1 — — –1.1 –1.1	—	V	V_{CC} = -5V, I_O = -100µA
	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK	$V_{I(ON)}$	—	-1.9 -1.9 — — -1.9 -1.9	-3.0 -3.0 -1.4 -1.1 -3.0 -3.0	V	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 = -1mA
Output Voltage	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK	$V_{O(ON)}$	—	-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 = -5mA/-0.25mA
Input Current	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK	I_I	—	—	-0.36 -0.18 -0.88 -3.6 -0.88 -0.15	mA	V_I = -5V
Output Current		$I_{O(OFF)}$	—	—	-0.5	µA	V_{CC} = 50V, V_I = 0V
DC Current Gain	DCX124EK DCX144EK DCX114YK DCX123JK DCX114EK DCX115EK	G_I	80 68 68 80 30 82	—	—	—	V_O = -5V, I_O = -5mA V_O = -5V, I_O = -5mA V_O = -5V, I_O = -10mA V_O = -5V, I_O = -10mA V_O = -5V, I_O = -5mA V_O = -5V, I_O = -5mA
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		R_2/R_1	-20	—	+20	%	—
Gain-Bandwidth Product*		f_T	—	250	—	MHz	V_{CE} = -10V, I_E = -5mA, f = 100MHz

*Transistor - For Reference Only

Typical Curves – Total Device

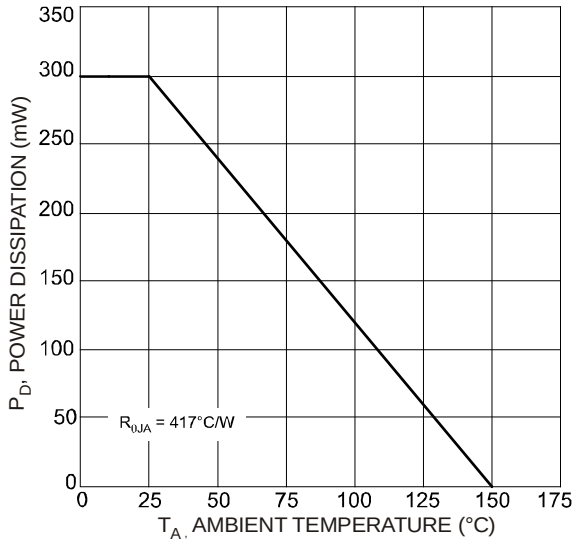


Fig. 1 Power Dissipation vs. Ambient Temperature