



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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Features

- Supply Voltage $V_O = 50V$
- Range of Bias Resistors
- Surface-Mount Package Suited for Automated Assembly

Mechanical Data

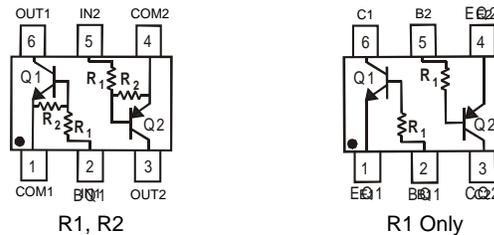
- Package: SOT363
- Package Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 ③
- Weight: 0.006 grams (Approximate)

Part Number	R1(NOM)	R2(NOM)
NK-DCX124EU	22k Ω	22k Ω
NK-DCX144EU	47k Ω	47k Ω
NK-DCX114YU	10k Ω	47k Ω
NK-DCX123JU	2.2k Ω	47k Ω
NK-DCX114EU	10k Ω	10k Ω
NK-DCX143EU	4.7k Ω	4.7k Ω
NK-DCX143ZU	4.7k Ω	47k Ω
NK-DCX115EU	100k Ω	100k Ω

Part Number	R1 Only
NK-DCX143TU	4.7k Ω
NK-DCX114TU	10k Ω



Top View



Device Schematic

Absolute Maximum Ratings NPN Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage		V_o	50	V
Input Voltage	NK-DCX124EU	V_i	-10 to +40	V
	NK-DCX144EU		-10 to +40	
	NK-DCX114YU		-6 to +40	
	NK-DCX123JU		-5 to +12	
	NK-DCX114EU		-10 to +40	
	NK-DCX143TU		-5V Max	
	NK-DCX143EU		-10 to +30	
	NK-DCX114TU		-5V Max	
	NK-DCX143ZU		-10 to +30	
NK-DCX115EU	-10 to +40			
Output Current	NK-DCX124EU	I_o	30	mA
	NK-DCX144EU		30	
	NK-DCX114YU		70	
	NK-DCX123JU		100	
	NK-DCX114EU		50	
	NK-DCX143TU		100	
	NK-DCX143EU		100	
	NK-DCX114TU		100	
	NK-DCX143ZU		100	
NK-DCX115EU	20			
Peak Output Current		I_{CM}	100	mA

Absolute Maximum Ratings PNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Supply Voltage		V_o	50	V
Input Voltage	NK-DCX124EU	V_i	+10 to -40	V
	NK-DCX144EU		+10 to -40	
	NK-DCX114YU		+6 to -40	
	NK-DCX123JU		+5 to -12	
	NK-DCX114EU		+10 to -40	
	NK-DCX143TU		+5V Max	
	NK-DCX143EU		+10 to -30	
	NK-DCX114TU		+5V Max	
	NK-DCX143ZU		+5 to -30	
NK-DCX115EU	+10 to -40			
Output Current	NK-DCX124EU	I_o	-30	mA
	NK-DCX144EU		-30	
	NK-DCX114YU		-70	
	NK-DCX123JU		-100	
	NK-DCX114EU		-50	
	NK-DCX143TU		-100	
	NK-DCX143EU		-100	
	NK-DCX114TU		-100	
	NK-DCX143ZU		-100	
NK-DCX115EU	-20			
Peak Output Current		I_{CM}	-100	mA

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, 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	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

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

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

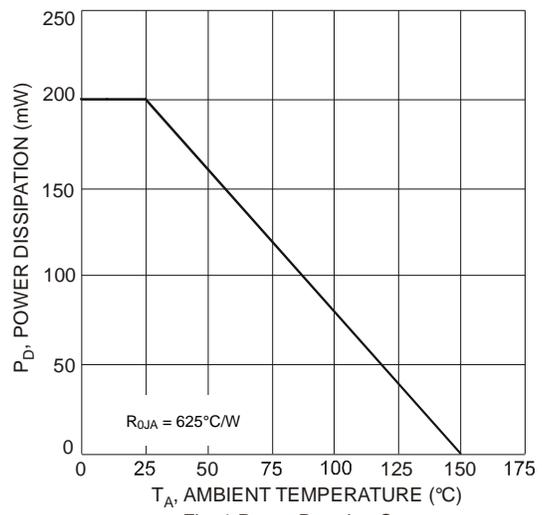


Fig. 1 Power Derating Curve

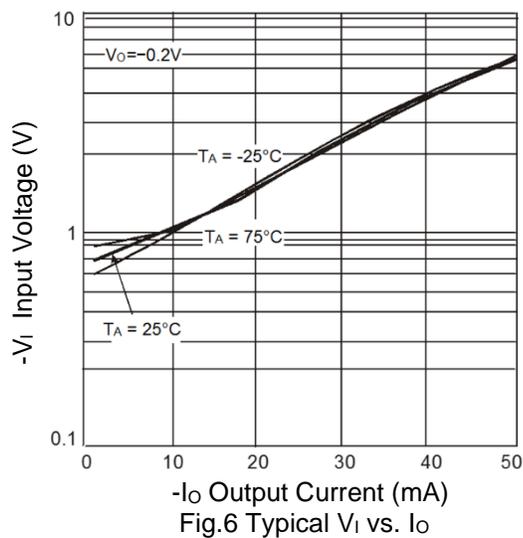
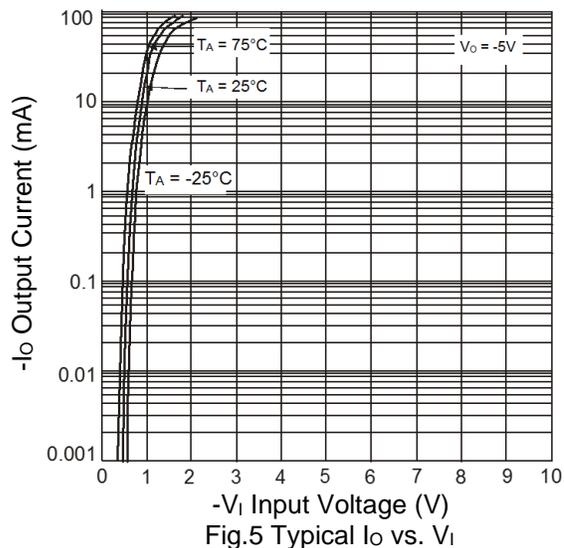
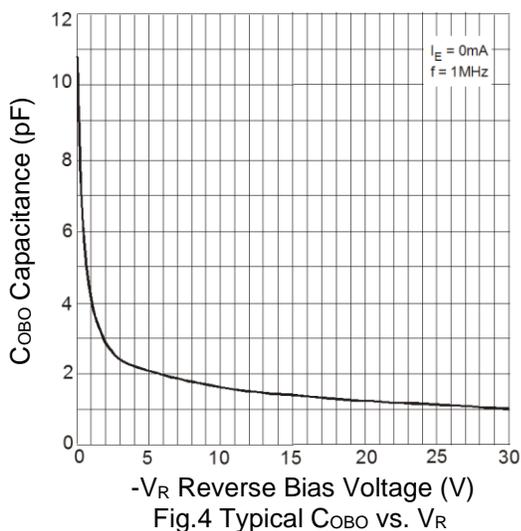
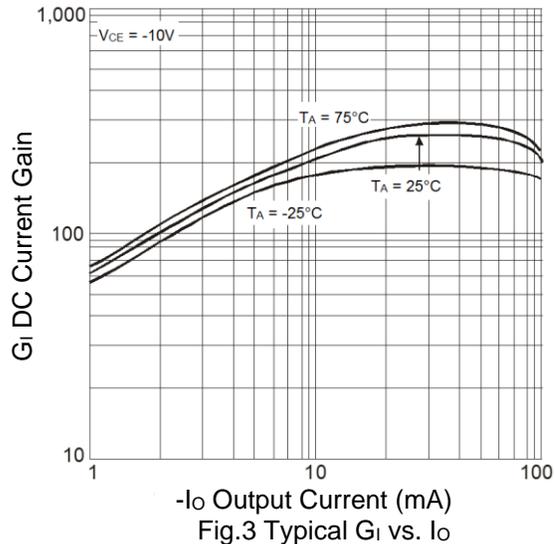
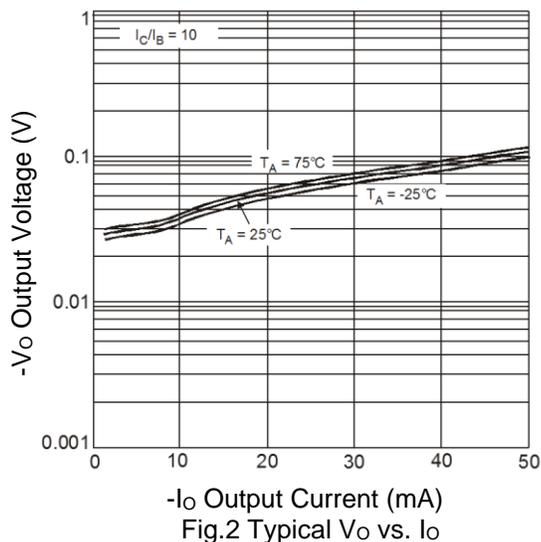
Electrical Characteristics NPN Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
R1 Only (NK-DCX143TU & NK-DCX114TU)							
Collector-Base Breakdown Voltage		BV_{CBO}	50	—	—	V	$I_C = 50\mu\text{A}$
Collector-Emitter Breakdown Voltage Emitter		BV_{CEO}	50	—	—	V	$I_C = 1\text{mA}$
-Base Breakdown Voltage		BV_{EBO}	5	—	—	V	$I_E = 50\mu\text{A}$
Collector Cutoff Current		I_{CBO}	—	—	0.5	μA	$V_{CB} = 50\text{V}$
Emitter Cutoff Current		I_{EBO}	—	—	0.5	μA	$V_{EB} = 4\text{V}$
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ NK-DCX143TU $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ NK-DCX114TU
DC Current Transfer Ratio		h_{FE}	100	250	600	—	$I_C = 1\text{mA}, V_{CE} = 5\text{V}$
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Gain-Bandwidth Product		f_T	—	250	—	MHz	$V_{CE} = 10\text{V}, I_E = 5\text{mA}, f = 100\text{MHz}$
R1/R2 Only							
Input Voltage	NK-DCX124EU	$V_{I(off)}$	0.5	1.1	—	V	$V_{CC} = 5\text{V}, I_O = 100\mu\text{A}$
	NK-DCX144EU		0.5	1.1			
	NK-DCX114YU		0.3	—			
	NK-DCX123JU		0.5	—			
	NK-DCX114EU		0.5	1.1			
	NK-DCX143EU		0.5	1.16			
	NK-DCX143ZU		0.5	—			
	NK-DCX115EU		0.5	—			
	NK-DCX124EU	$V_{I(on)}$	—	1.9	3.0	V	$V_O = 0.3\text{V}, I_O = 5\text{mA}$
	NK-DCX144EU		—	1.9	3.0		$V_O = 0.3\text{V}, I_O = 2\text{mA}$
	NK-DCX114YU		—	—	1.4		$V_O = 0.3\text{V}, I_O = 1\text{mA}$
	NK-DCX123JU		—	—	1.1		$V_O = 0.3\text{V}, I_O = 5\text{mA}$
	NK-DCX114EU		—	1.9	3.0		$V_O = 0.3\text{V}, I_O = 10\text{mA}$
	NK-DCX143EU		—	1.99	3.0		$V_O = 0.3\text{V}, I_O = 20\text{mA}$
NK-DCX143ZU	—		—	1.3	$V_O = 0.3\text{V}, I_O = 5\text{mA}$		
NK-DCX115EU	—	—	3	$V_O = 0.3\text{V}, I_O = 1\text{mA}$			
Output Voltage	NK-DCX124EU	$V_{O(on)}$	—	0.1	0.3	V	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	NK-DCX144EU		—	—	—		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	NK-DCX114YU		—	—	—		$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	NK-DCX123JU		—	—	—		$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
	NK-DCX114EU		—	—	—		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	NK-DCX143EU		—	—	—		$I_O/I_I = 10\text{mA} / 0.5\text{mA}$
	NK-DCX143ZU		—	—	—		$I_O/I_I = 5\text{mA} / 0.25\text{mA}$
NK-DCX115EU	—	—	—	$I_O/I_I = 10\text{mA} / 0.5\text{mA}$			
Input Current	NK-DCX124EU	I_I	—	—	0.36	mA	$V_I = 5\text{V}$
	NK-DCX144EU		—	—	0.18		
	NK-DCX114YU		—	—	0.88		
	NK-DCX123JU		—	—	3.6		
	NK-DCX114EU		—	—	0.88		
	NK-DCX143EU		—	—	0.88		
	NK-DCX143ZU		—	—	1.8		
NK-DCX115EU	—	—	0.15				
Output Current		$I_{O(off)}$	—	—	0.5	μA	$V_{CC} = 50\text{V}, V_I = 0\text{V}$
DC Current Gain	NK-DCX124EU	G_I	56	—	—	—	$V_O = 5\text{V}, I_O = 5\text{mA}$
	NK-DCX124EUQ		60				$V_O = 5\text{V}, I_O = 5\text{mA}$
	NK-DCX144EU		68				$V_O = 5\text{V}, I_O = 5\text{mA}$
	NK-DCX114YU		68				$V_O = 5\text{V}, I_O = 10\text{mA}$
	NK-DCX114YUQ		80				$V_O = 5\text{V}, I_O = 10\text{mA}$
	NK-DCX123JU		80				$V_O = 5\text{V}, I_O = 10\text{mA}$
	NK-DCX114EU		30				$V_O = 5\text{V}, I_O = 5\text{mA}$
	NK-DCX143EU		50				$V_O = 5\text{V}, I_O = 10\text{mA}$
	NK-DCX143ZU		80				$V_O = 5\text{V}, I_O = 10\text{mA}$
NK-DCX115EU	82	$V_O = 5\text{V}, I_O = 5\text{mA}$					
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—
Resistance Ratio Tolerance		$\Delta R_2/R_1$	-20	—	+20	%	—
Gain-Bandwidth Product		f_T	—	250	—	MHz	$V_{CE} = 10\text{V}, I_E = 5\text{mA}, f = 100\text{MHz}$

Electrical Characteristics PNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition	
R1 Only (NK-DCX143TU & NK-DCX114TU)								
Collector-Base Breakdown Voltage		BV_{CBO}	-50	—	—	V	$I_C = -50\mu\text{A}$	
Collector-Emitter Breakdown Voltage Emitter-		BV_{CEO}	-50	—	—	V	$I_C = -1\text{mA}$	
Base Breakdown Voltage		BV_{EBO}	-5	—	—	V	$I_E = -50\mu\text{A}$	
Collector Cutoff Current		I_{CBO}	—	—	-0.5	μA	$V_{CB} = -50\text{V}$	
Emitter Cutoff Current		I_{EBO}	—	—	-0.5	μA	$V_{EB} = -4\text{V}$	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	—	-0.3	V	$I_C/I_B = 2.5\text{mA} / 0.25\text{mA}$ NK-DCX143TU $I_C/I_B = 1\text{mA} / 0.1\text{mA}$ NK-DCX114TU	
DC Current Transfer Ratio		h_{FE}	100	250	600	—	$I_C = -1\text{mA}$, $V_{CE} = -5\text{V}$	
Input Resistor (R_1) Tolerance		ΔR_1	-30	—	+30	%	—	
Gain-Bandwidth Product		f_T	—	250	—	MHz	$V_{CE} = -10\text{V}$, $I_E = -5\text{mA}$, $f = 100\text{MHz}$	
R1/R2 Only								
Input Voltage	NK-DCX124EU	$V_{I(off)}$	-0.5	-1.1	—	V	$V_{CC} = -5\text{V}$, $I_O = -100\mu\text{A}$	
	NK-DCX144EU		-0.5	-1.1				
	NK-DCX114YU		-0.3	—				
	NK-DCX123JU		-0.5	—				
	NK-DCX114EU		-0.5	-1.1				
	NK-DCX143EU		-0.5	-1.16				
	NK-DCX143ZU		-0.5	—				
	NK-DCX115EU		-0.5	—				
	NK-DCX124EU	$V_{I(on)}$	—	-1.9	-3.0	V	$V_O = -0.3\text{V}$, $I_O = -5\text{mA}$	
	NK-DCX144EU		—	-1.9	-3.0		$V_O = -0.3\text{V}$, $I_O = -2\text{mA}$	
	NK-DCX114YU		—	—	-1.4		$V_O = -0.3\text{V}$, $I_O = -1\text{mA}$	
	NK-DCX123JU		—	—	-1.1		$V_O = -0.3\text{V}$, $I_O = -5\text{mA}$	
	NK-DCX114EU		—	-1.9	-3.0		$V_O = -0.3\text{V}$, $I_O = -10\text{mA}$	
	NK-DCX143EU		—	-2.5	-3.0		$V_O = -0.3\text{V}$, $I_O = -20\text{mA}$	
NK-DCX143ZU	—		—	-1.3	$V_O = -0.3\text{V}$, $I_O = -5\text{mA}$			
NK-DCX115EU	—		—	-3	$V_O = -0.3\text{V}$, $I_O = -1\text{mA}$			
Output Voltage	NK-DCX124EU	$V_{O(on)}$	—	-0.1	-0.3	V	$I_O/I_I = -10\text{mA} / -0.5\text{mA}$	
	NK-DCX144EU						$I_O/I_I = -10\text{mA} / -0.5\text{mA}$	
	NK-DCX114YU						$I_O/I_I = -5\text{mA} / -0.25\text{mA}$	
	NK-DCX123JU						$I_O/I_I = -5\text{mA} / -0.25\text{mA}$	
	NK-DCX114EU						$I_O/I_I = -10\text{mA} / -0.5\text{mA}$	
	NK-DCX143EU						$I_O/I_I = -10\text{mA} / -0.5\text{mA}$	
	NK-DCX143ZU						$I_O/I_I = -5\text{mA} / -0.25\text{mA}$	
	NK-DCX115EU						$I_O/I_I = -10\text{mA} / -0.5\text{mA}$	
Input Current	NK-DCX124EU	I_I	—	—	—	mA	$V_I = -5\text{V}$	
	NK-DCX144EU							-0.36
	NK-DCX114YU							-0.18
	NK-DCX123JU							-0.88
	NK-DCX114EU							-3.6
	NK-DCX143EU							-0.88
	NK-DCX143ZU							-0.88
	NK-DCX115EU							-1.8
Output Current	$I_{O(off)}$	—	—	-0.5	μA	$V_{CC} = -50\text{V}$, $V_I = 0\text{V}$		
DC Current Gain	NK-DCX124EU	G_i	56	—	—	—	$V_O = -5\text{V}$, $I_O = -5\text{mA}$	
	DCX124EUQ						60	$V_O = -5\text{V}$, $I_O = -5\text{mA}$
	NK-DCX144EU						68	$V_O = -5\text{V}$, $I_O = -5\text{mA}$
	NK-DCX114YU						68	$V_O = -5\text{V}$, $I_O = -10\text{mA}$
	NK-DCX114YUQ						80	$V_O = -5\text{V}$, $I_O = -10\text{mA}$
	NK-DCX123JU						80	$V_O = -5\text{V}$, $I_O = -10\text{mA}$
	NK-DCX114EU						30	$V_O = -5\text{V}$, $I_O = -5\text{mA}$
	NK-DCX143EU						40	$V_O = -5\text{V}$, $I_O = -10\text{mA}$
	NK-DCX143ZU						80	$V_O = -5\text{V}$, $I_O = -10\text{mA}$
NK-DCX115EU	82	$V_O = -5\text{V}$, $I_O = -5\text{mA}$						
Input Resistor (R_1) Tolerance	ΔR_1	-30	—	+30	%	—		
Resistance Ratio Tolerance	$\Delta R_2/R_1$	-20	—	+20	%	—		
Gain-Bandwidth Product	f_T	—	250	—	MHz	$V_{CE} = -10\text{V}$, $I_E = -5\text{mA}$, $f = 100\text{MHz}$		

Typical Curves – NK-DCX123JU PNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Typical Curves – NK-DCX123JUNPN Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

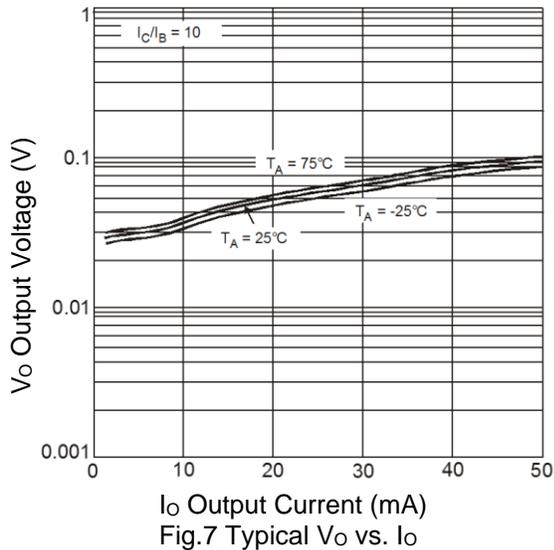


Fig.7 Typical V_O vs. I_O

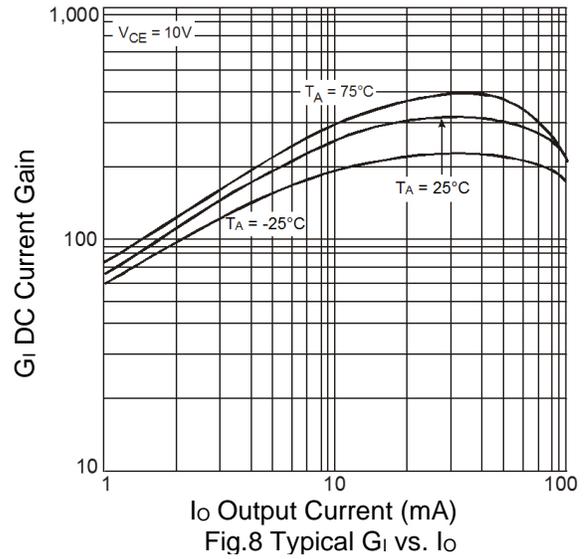


Fig.8 Typical G_i vs. I_O

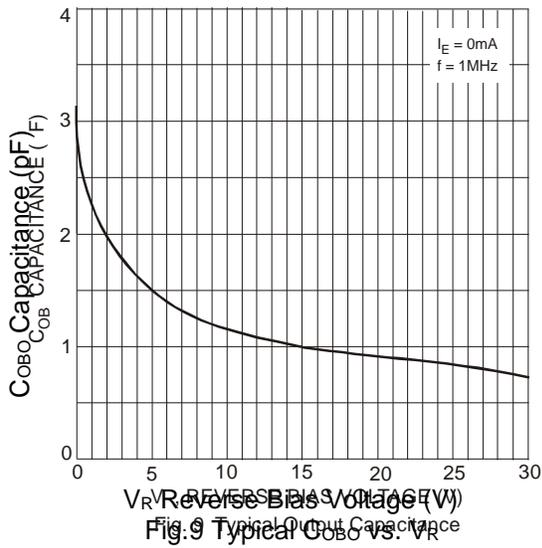


Fig.9 Typical C_{ob} vs. V_R

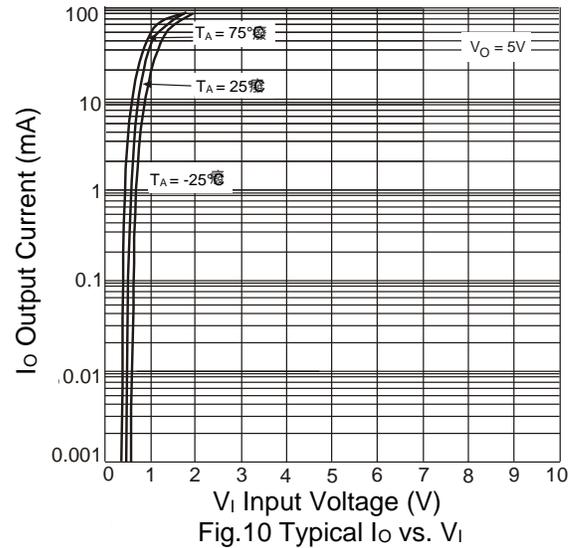


Fig.10 Typical I_O vs. V_i

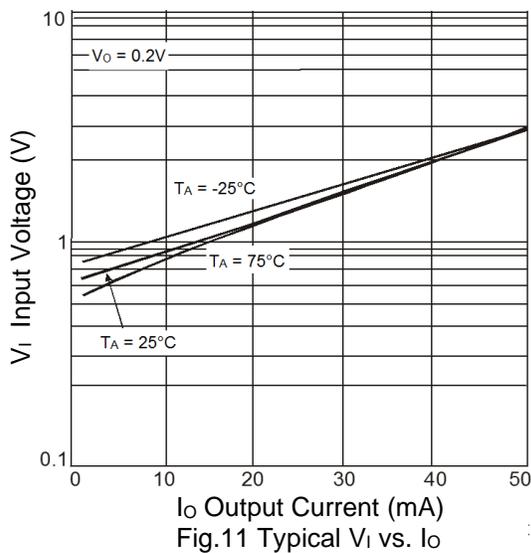
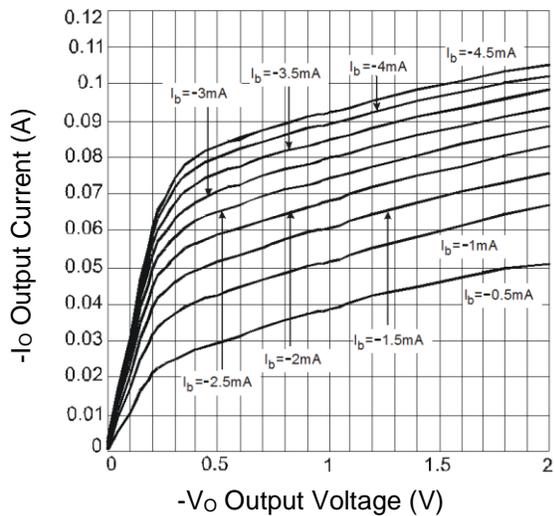
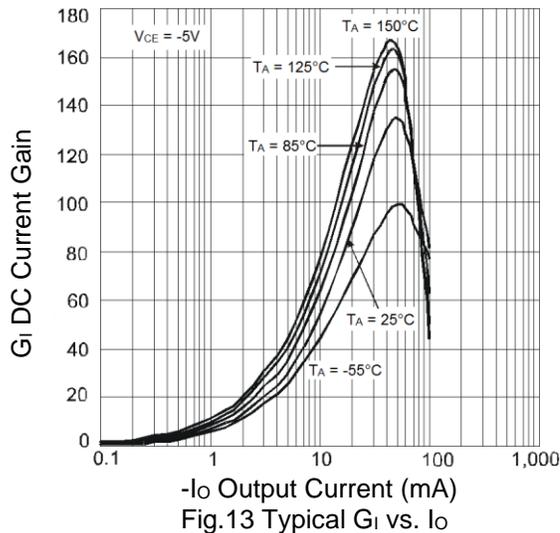


Fig.11 Typical V_i vs. I_O

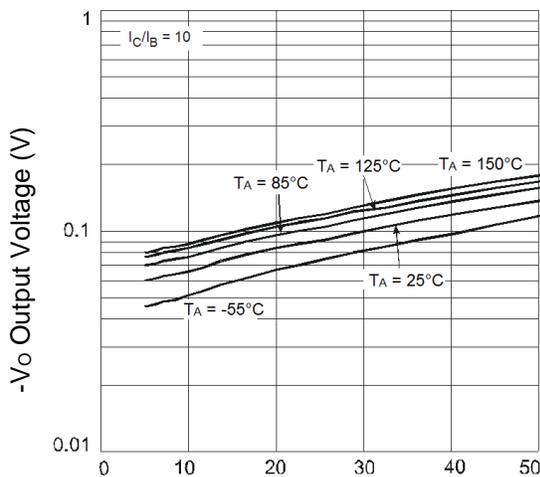
Typical Curves – NK-DCX143EUPNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



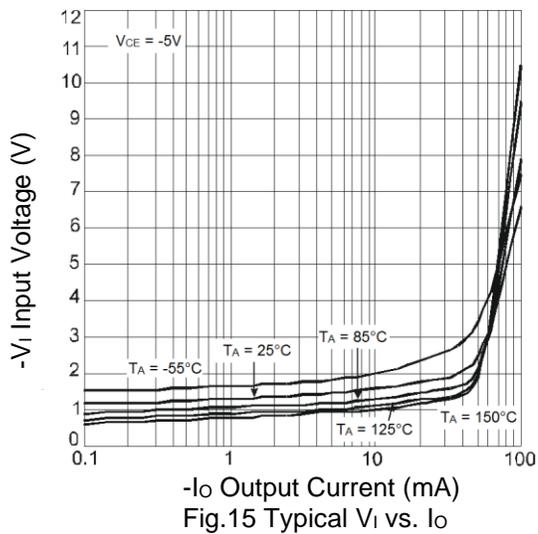
-V_o Output Voltage (V)
Fig.12 Typical I_o vs. V_o



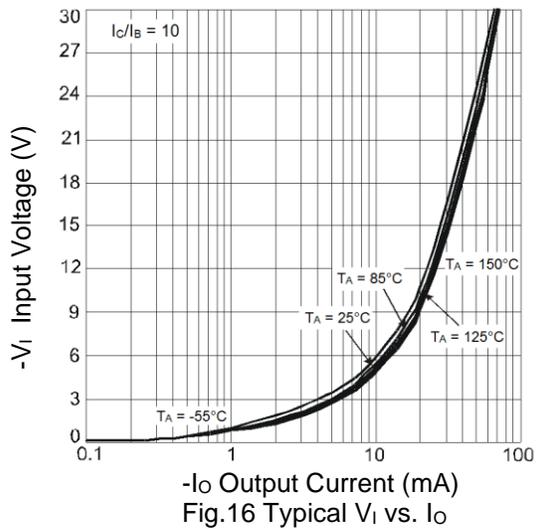
-I_o Output Current (mA)
Fig.13 Typical G_i vs. I_o



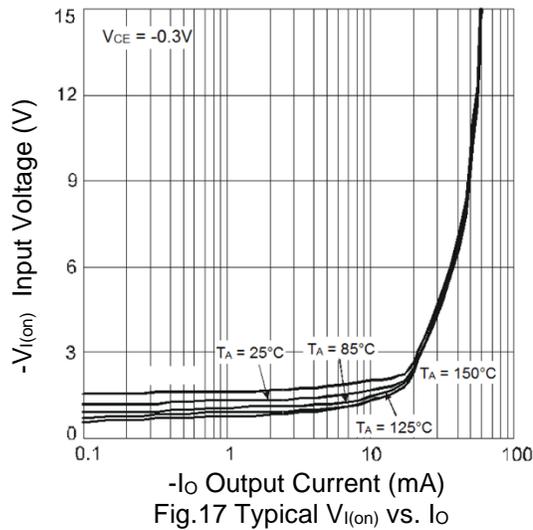
-I_o Output Current (mA)
Fig.14 Typical V_o vs. I_o



-I_o Output Current (mA)
Fig.15 Typical V_i vs. I_o

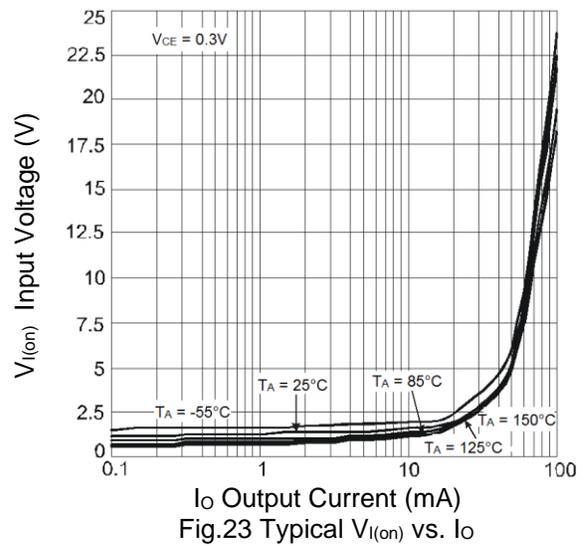
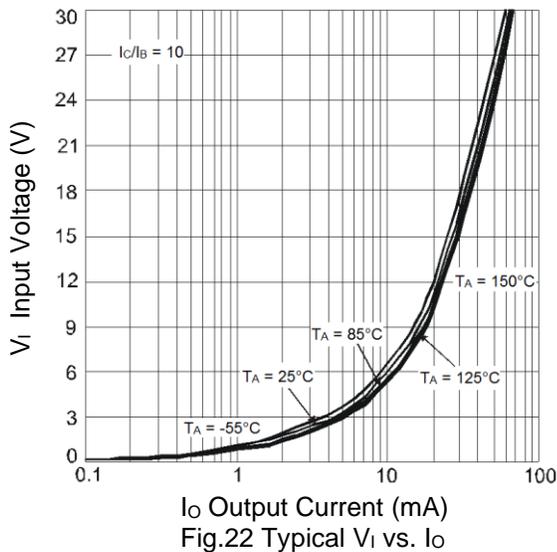
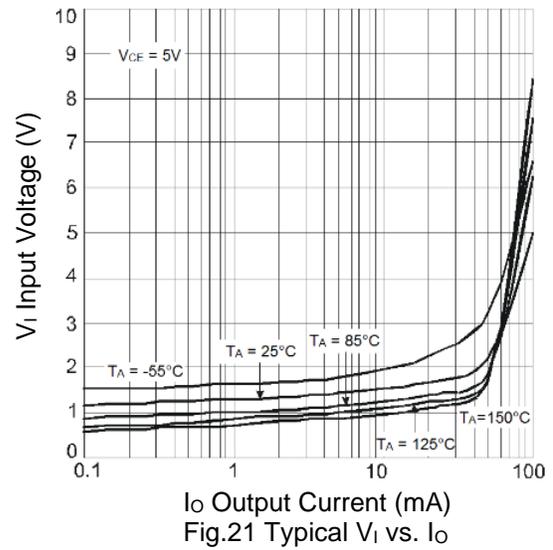
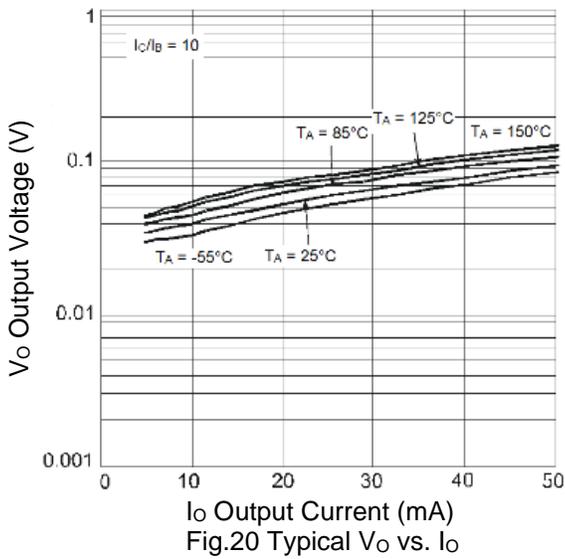
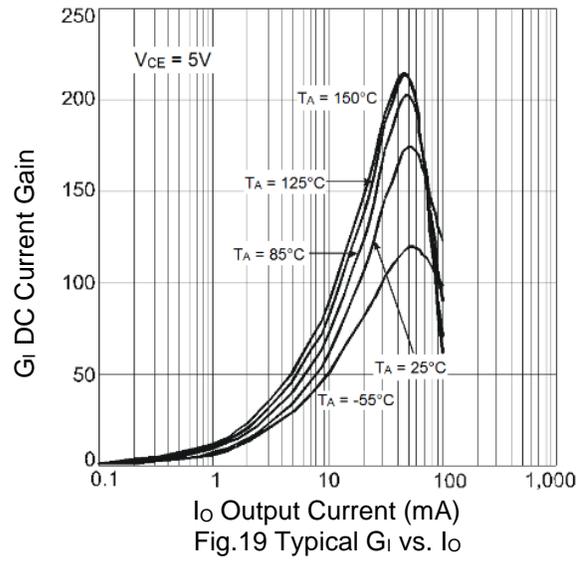
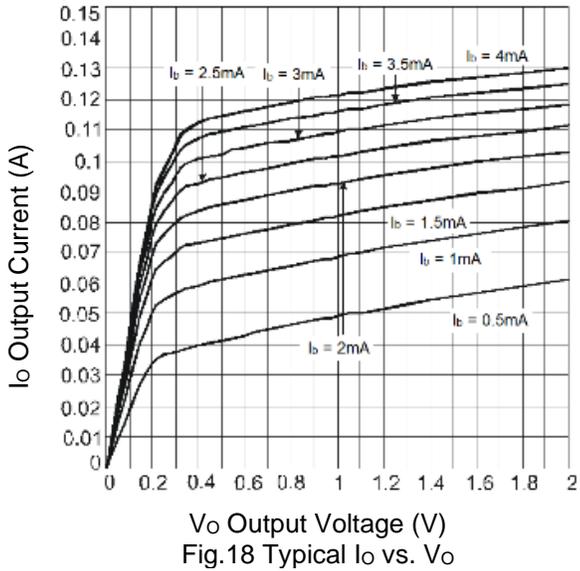


-I_o Output Current (mA)
Fig.16 Typical V_i vs. I_o



-I_o Output Current (mA)
Fig.17 Typical V_{i(on)} vs. I_o

Typical Curves – NK-DCX143EU NPN Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Typical Curves – NK-DCX114TUPNP Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

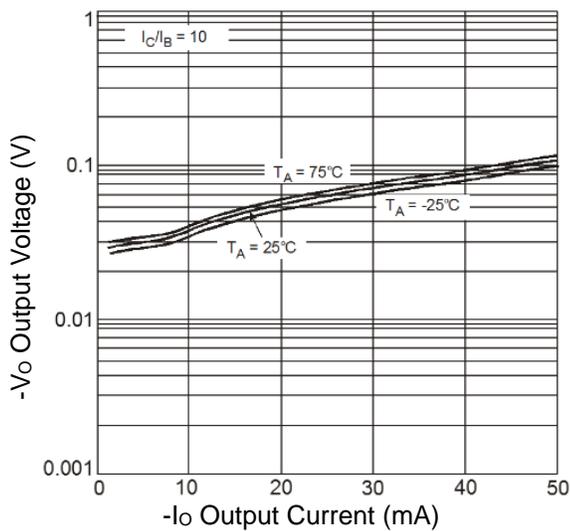


Fig.24 Typical V_O vs. I_o

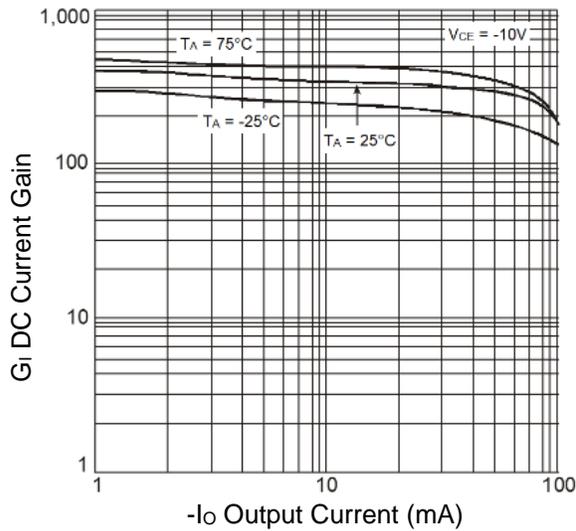


Fig.25 Typical G_I vs. I_o

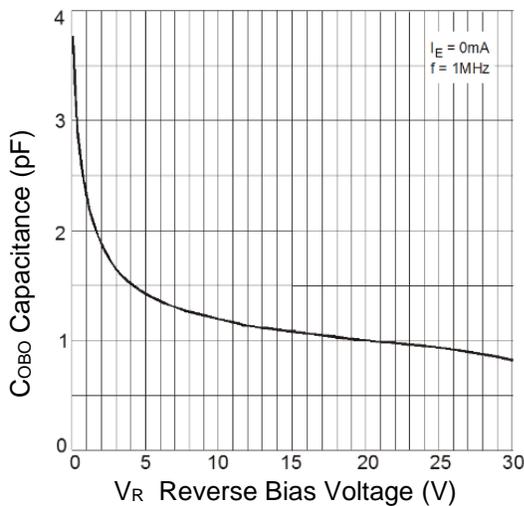


Fig.26 Typical C_{OBO} vs. V_R

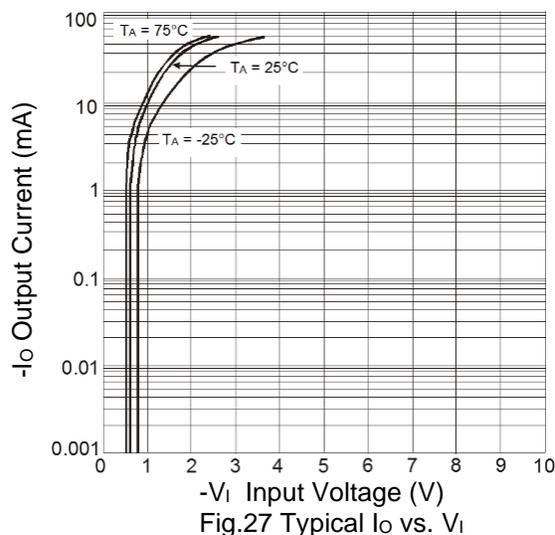


Fig.27 Typical I_o vs. V_I

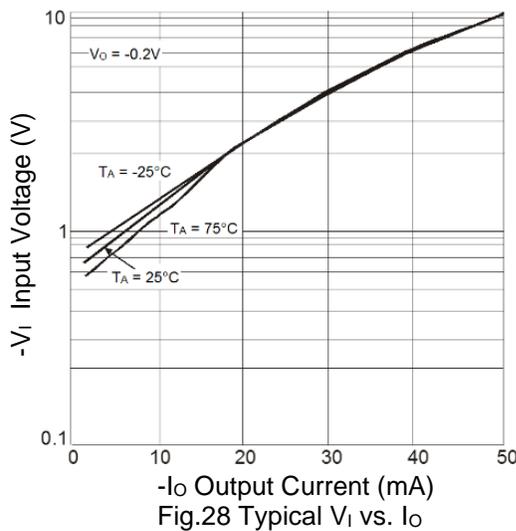


Fig.28 Typical V_I vs. I_o

Typical Curves – NK-DCX114TUNPN Section (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

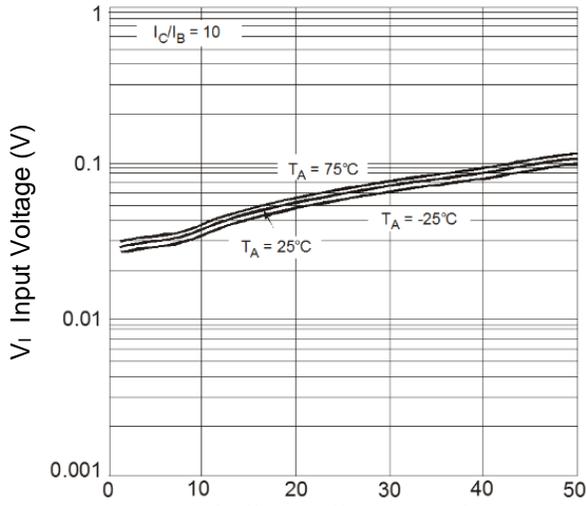


Fig.29 Typical V_I vs. I_o

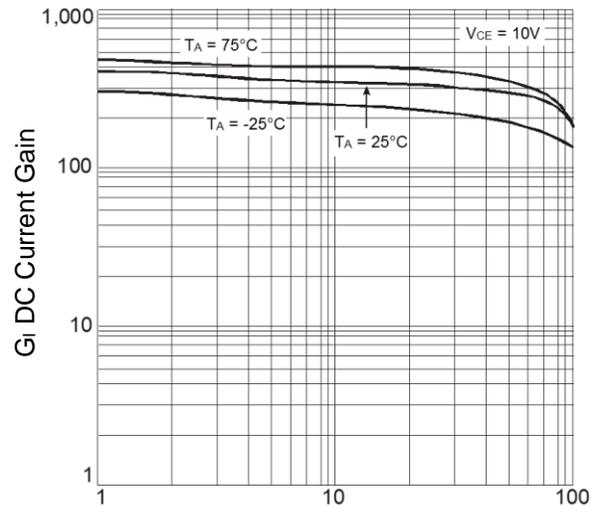


Fig.30 Typical G_I vs. I_o

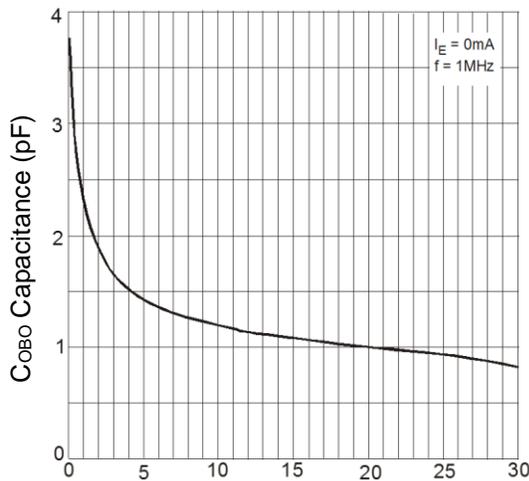


Fig.31 Typical C_{OBO} vs. V_R

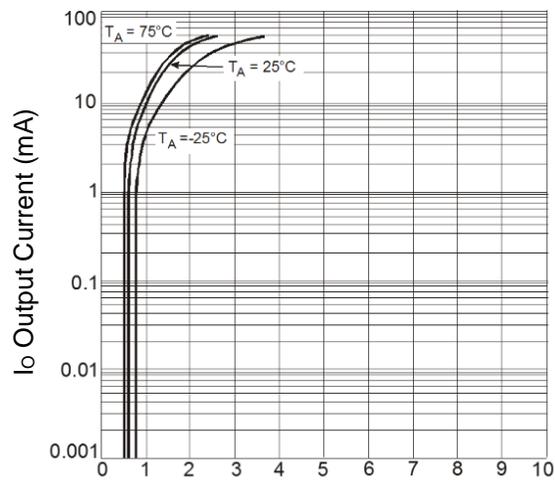


Fig.32 Typical I_o vs. V_I

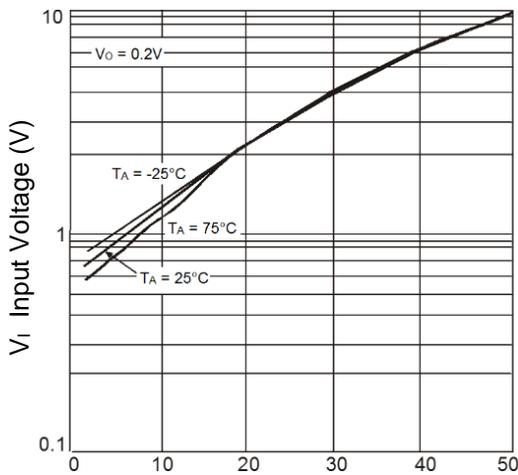
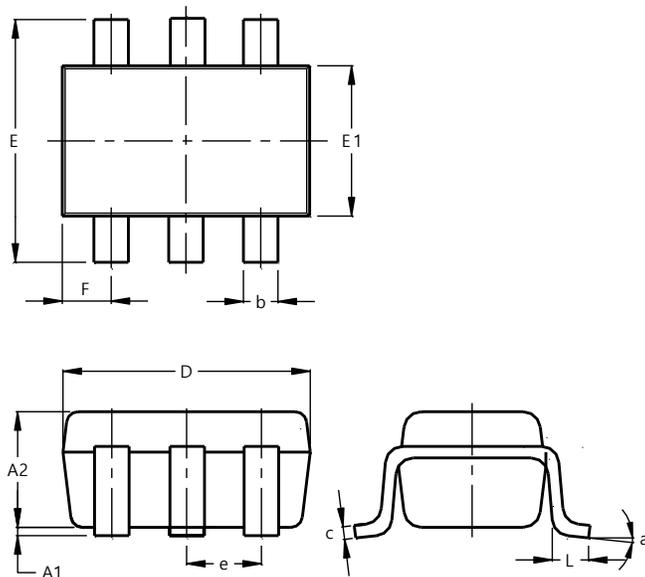


Fig.33 Typical V_I vs. I_o

Package Outline Dimensions

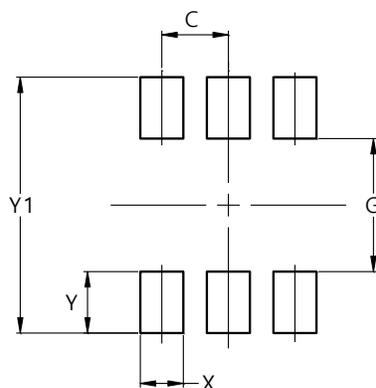
SOT363



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

SOT363



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