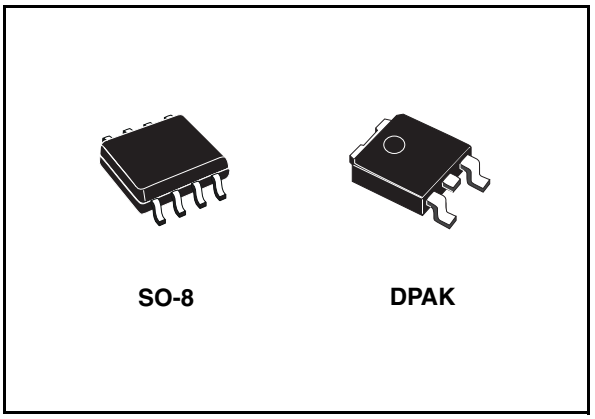
KF00 series

Very low drop voltage regulators with inhibit

Features

- Very low dropout voltage (0.4V)
- Very low quiescent current (typ. 50 µA in OFF MODE, 500 µA in ON MODE)
- Output current up to 500 mA
- Logic-controlled electronic shutdown
- Output voltages of 1.5; 2.5; 3; 3.3; 4; 5; 5.2; 6; 8
- Internal current and thermal limit
- Only 2.2 µF for stability
- Available in ± 2% accuracy at 25 °C
- Supply voltage rejection: 70 db (typ.)
- Temperature range: -40 to 125 °C



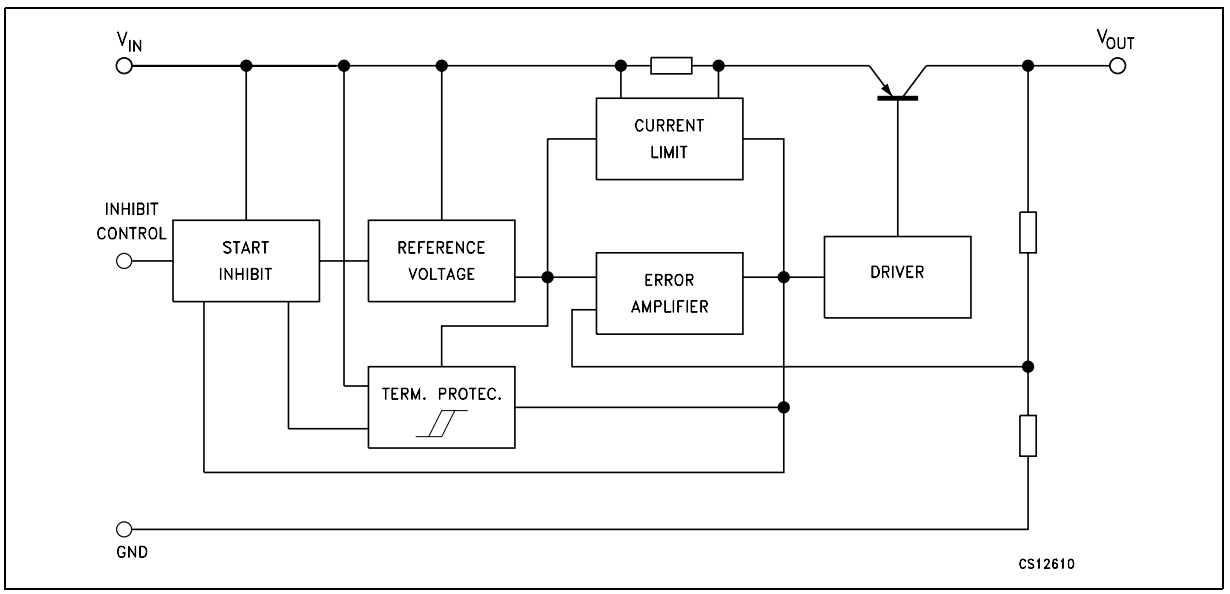
Description

The KF00 series are very Low Drop regulators available in SO-8 package and in a wide range of output voltages.

The very Low Drop voltage (0.4V) and the very low quiescent current make them particularly suitable for Low Noise, Low Power applications and specially in battery powered systems.

A Shutdown Logic Control function is available (pin 5, TTL compatible). This means that when the device is used as a local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption. It requires only a 2.2 µF capacitor for stability allowing space and cost saving.

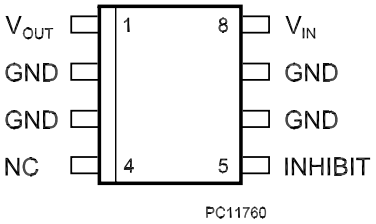
Schematic diagram



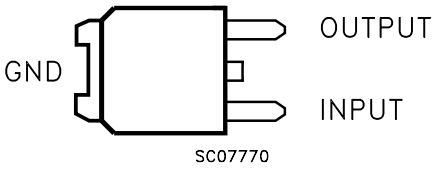
Contents

1 Pin configuration

Figure 1. Pin connections (top view)



SO-8



DPAK

2 Maximum ratings

Table 1. Absolute maximum ratings

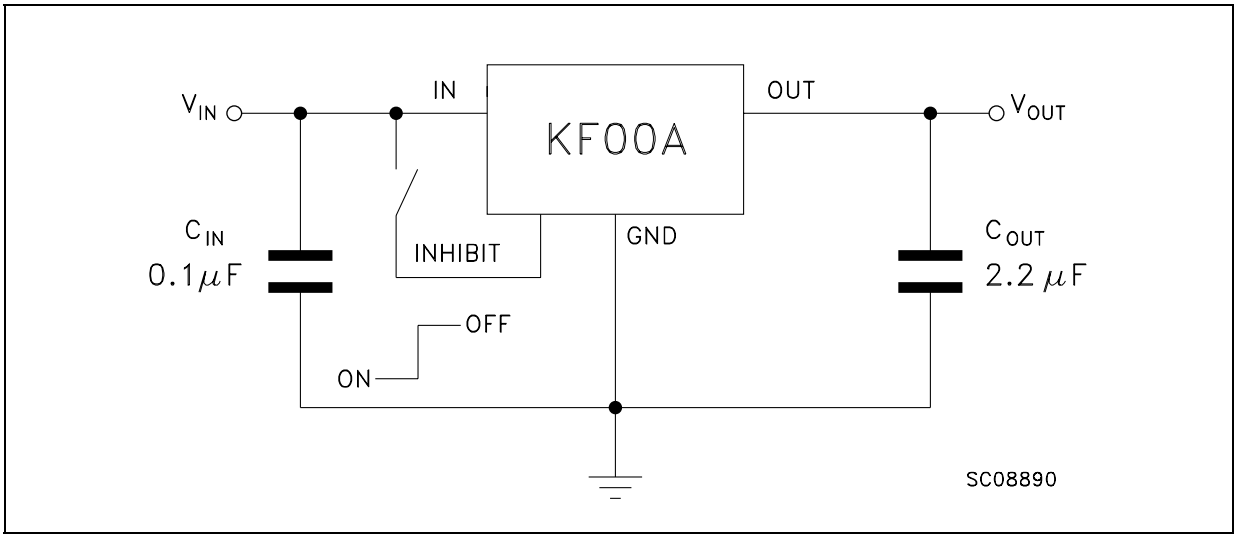
Symbol	Parameter	Value	Unit
V_I	DC Input Voltage	-0.5 to 20	V
I_O	Output Current	Internally Limited	
P_{TOT}	Power Dissipation	Internally Limited	
T_{STG}	Storage Temperature Range	-40 to 150	°C
T_{OP}	Operating Junction Temperature Range	-40 to 125	°C

Note: Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

Table 2. Thermal data

Symbol	Parameter	DPAK	SO-8	Unit
R_{thJC}	Thermal resistance junction-case	8	20	°C/W

Figure 2. Test circuit



3 Electrical characteristics

Table 3. Electrical characteristics for KF15 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 3.5 V		1.47	1.5	1.53	V
		I_O = 50 mA, V_I = 3.5 V, T_a = -25 to 85°C		1.44		1.56	
V_I	Operating input voltage	I_O = 500 mA		2.5		20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 2.5 to 20 V, I_O = 5 mA			2	12	mV
ΔV_O	Load regulation	V_I = 2.8 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 2.5 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 2.8 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 3.5 ± 1 V	f = 120 Hz		82		dB
			f = 1 KHz		77		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			1		V
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 4. Electrical characteristics for KF25 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 4.5 V		2.45	2.5	2.55	V
		I_O = 50 mA, V_I = 4.5 V, T_a = -25 to 85°C		2.4		2.6	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 3.5 to 20 V, I_O = 5 mA			2	12	mV
ΔV_O	Load regulation	V_I = 3.8 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 3.5 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 3.8 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 4.5 ± 1 V	f = 120 Hz		82		dB
			f = 1 KHz		77		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 5. Electrical characteristics for KF30 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 5 V		2.94	3	3.06	V
		I_O = 50 mA, V_I = 5 V, T_a = -25 to 85°C		2.88		3.12	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 4 to 20 V, I_O = 5 mA			2	12	mV
ΔV_O	Load regulation	V_I = 4.3 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 4 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 4.3 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 5 ± 1 V	f = 120 Hz		81		dB
			f = 1 KHz		76		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 6. Electrical characteristics for KF33 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 5.3 V		3.234	3.3	3.366	V
		I_O = 50 mA, V_I = 5.3 V, T_a = -25 to 85°C		3.168		3.432	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 4.3 to 20 V, I_O = 5 mA			2	12	mV
ΔV_O	Load regulation	V_I = 4.6 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 4.3 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 4.6 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 5.3 ± 1 V	f = 120 Hz		80		dB
			f = 1 KHz		75		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 7. Electrical characteristics for KF40 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 6 V		3.92	4	4.08	V
		I_O = 50 mA, V_I = 6 V, T_a = -25 to 85°C		3.84		4.16	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 5 to 20 V, I_O = 5 mA			3	18	mV
ΔV_O	Load regulation	V_I = 5.3 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 5 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 5.3 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 6 ± 1 V	f = 120 Hz		78		dB
			f = 1 KHz		73		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 8. Electrical characteristics for KF50 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 7 V		4.9	5	5.1	V
		I_O = 50 mA, V_I = 7 V, T_a = -25 to 85°C		4.8		5.2	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 6 to 20 V, I_O = 5 mA			3	18	mV
ΔV_O	Load regulation	V_I = 6.3 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 6 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 6.3 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 7 ± 1 V	f = 120 Hz		76		dB
			f = 1 KHz		71		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 9. Electrical characteristics for KF52 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 7.2 V		5.096	5.2	5.304	V
		I_O = 50 mA, V_I = 7.2 V, T_a = -25 to 85°C		4.992		5.408	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 6.2 to 20 V, I_O = 5 mA			3	18	mV
ΔV_O	Load regulation	V_I = 6.5 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 6.2 to 20V, I_O = 0mA	ON MODE		0.5	1	mA
		V_I = 6.5 to 20V, I_O=500mA				12	
		V_I = 6 V	OFF MODE		50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 7.2 ± 1 V	f = 120 Hz		76		dB
			f = 1 KHz		71		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 10. Electrical characteristics for KF60 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 8 V		5.88	6	6.12	V
		I_O = 50 mA, V_I = 8 V, T_a = -25 to 85°C		5.76		6.24	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 7 to 20 V, I_O = 5 mA			4	24	mV
ΔV_O	Load regulation	V_I = 7.3 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 7 to 20V, I_O = 0mA	ON MODE		0.7	1.5	mA
		V_I = 7.3 to 20V, I_O=500mA				12	
		V_I = 9 V	OFF MODE		70	140	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 8 ± 1 V	f = 120 Hz		75		dB
			f = 1 KHz		70		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

Table 11. Electrical characteristics for KF80 (refer to the test circuits, T_J = 25°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified.)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 50 mA, V_I = 10 V		7.84	8	8.16	V
		I_O = 50 mA, V_I = 10 V, T_a = -25 to 85°C		7.68		8.32	
V_I	Operating input voltage	I_O = 500 mA				20	V
I_O	Output current limit				1		A
ΔV_O	Line regulation	V_I = 9 to 20 V, I_O = 5 mA			4	24	mV
ΔV_O	Load regulation	V_I = 9.3 V, I_O = 5 to 500 mA			2	50	mV
I_d	Quiescent current	V_I = 9 to 20V, I_O = 0mA	ON MODE		0.7	1.5	mA
		V_I = 9.3 to 20V, I_O=500mA				12	
		V_I = 9 V	OFF MODE		70	140	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 10 ± 1 V	f = 120 Hz		72		dB
			f = 1 KHz		67		
			f = 10 KHz		60		
eN	Output noise voltage	B = 10 Hz to 100 KHz			50		µV
V_d	Dropout voltage	I_O = 200 mA			0.2	0.35	V
		I_O = 500 mA			0.4	0.7	
V_{IL}	Control input logic low	T_a = -40 to 125°C				0.8	V
V_{IH}	Control input logic high	T_a = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 500 mA		2	10		µF

4 Typical performance characteristics

(unless otherwise specified $V_{O(NOM)}$ = 3.3 V)

Figure 3. Dropout voltage vs output current

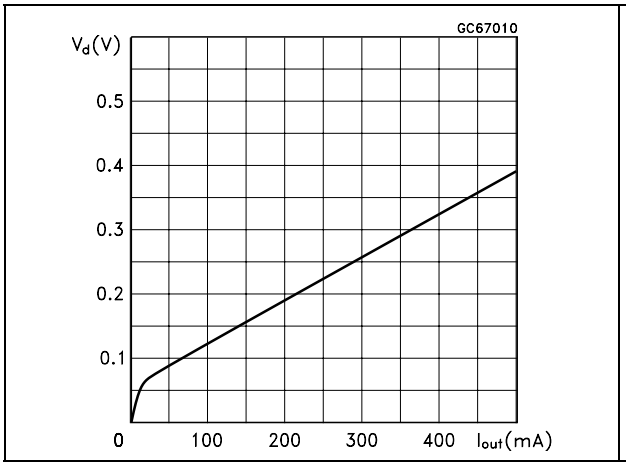


Figure 4. Dropout voltage vs temperature

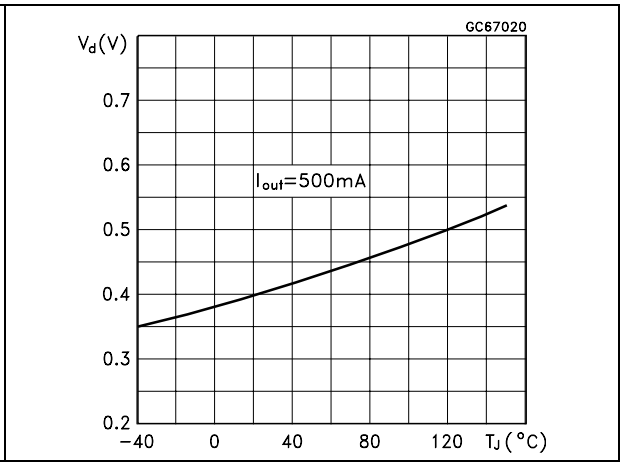


Figure 5. Supply current vs input voltage

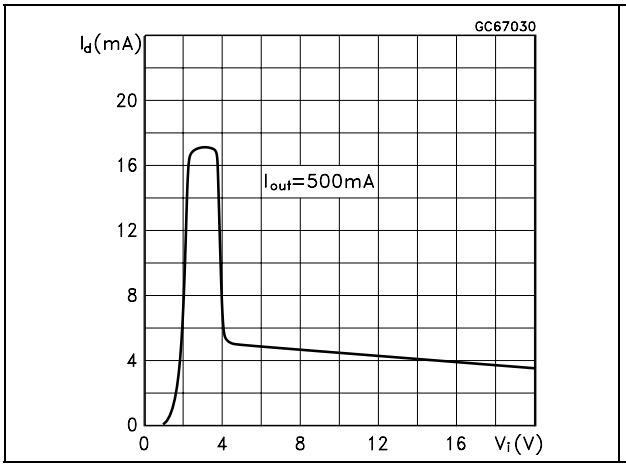


Figure 6. Supply current vs input voltage

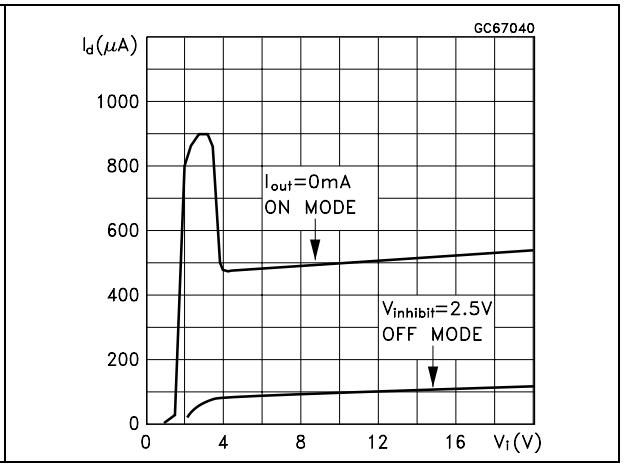


Figure 7. Short circuit current vs input voltage

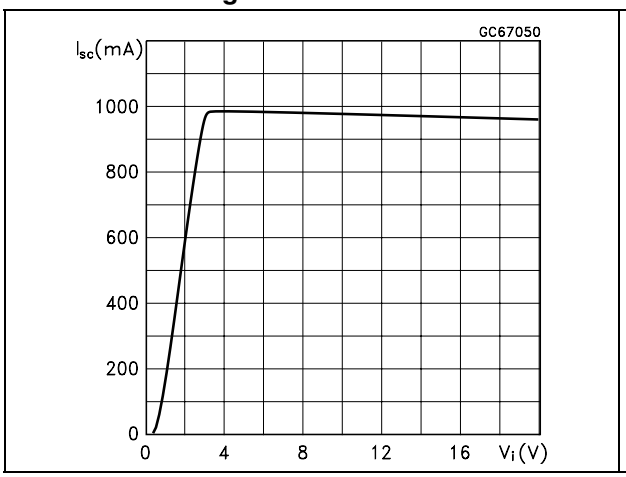
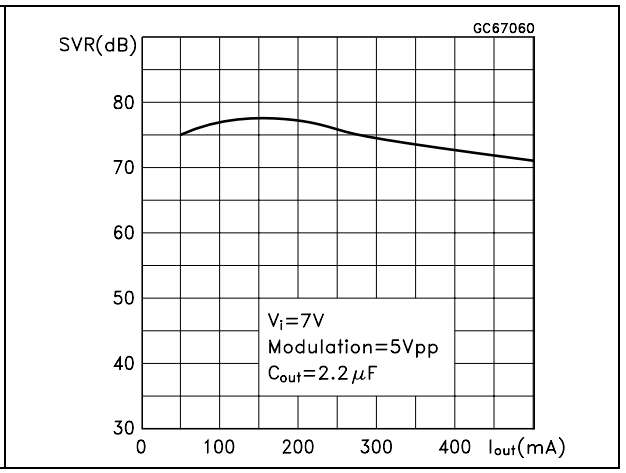


Figure 8. Supply current vs temperature

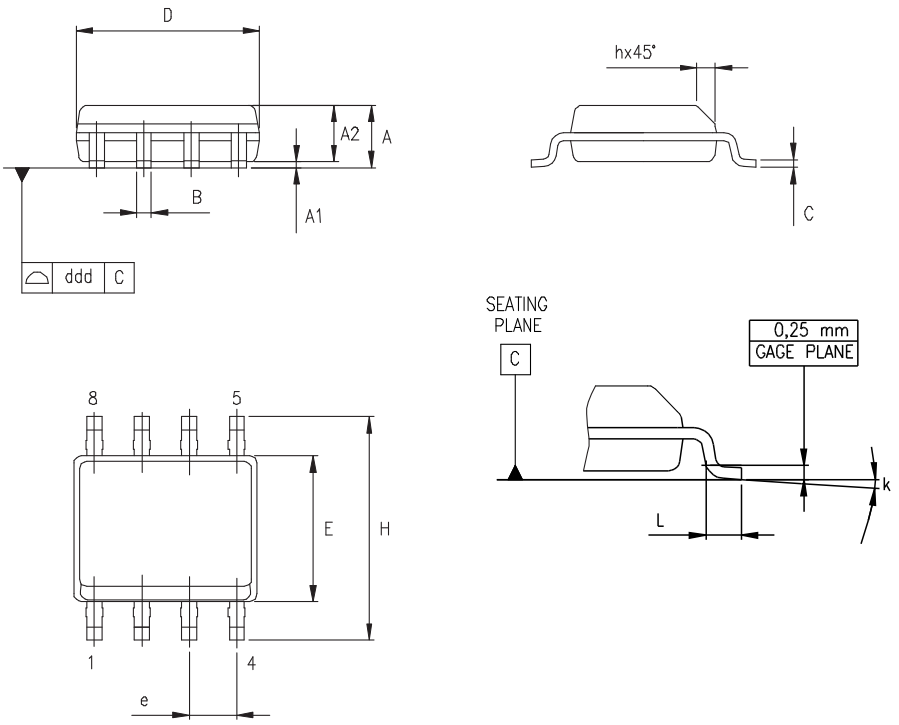


5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

SO-8 MECHANICAL DATA

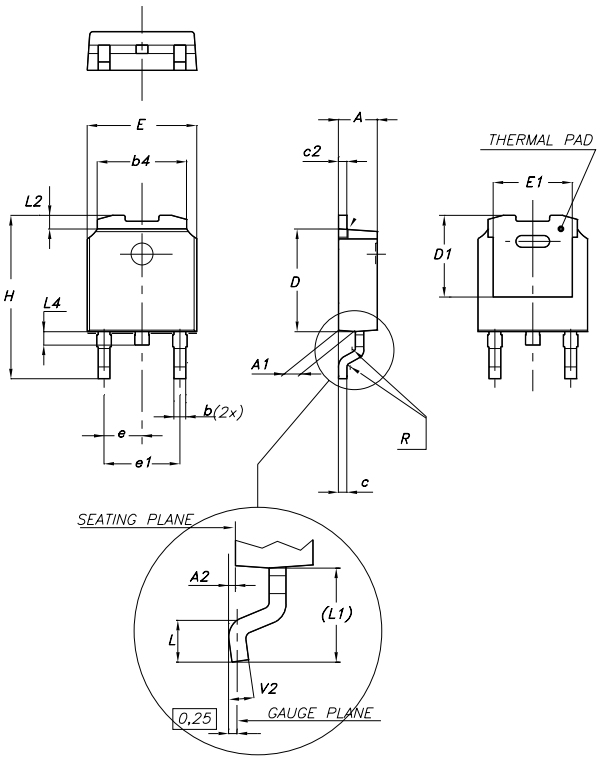
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

DPAK MECHANICAL DATA

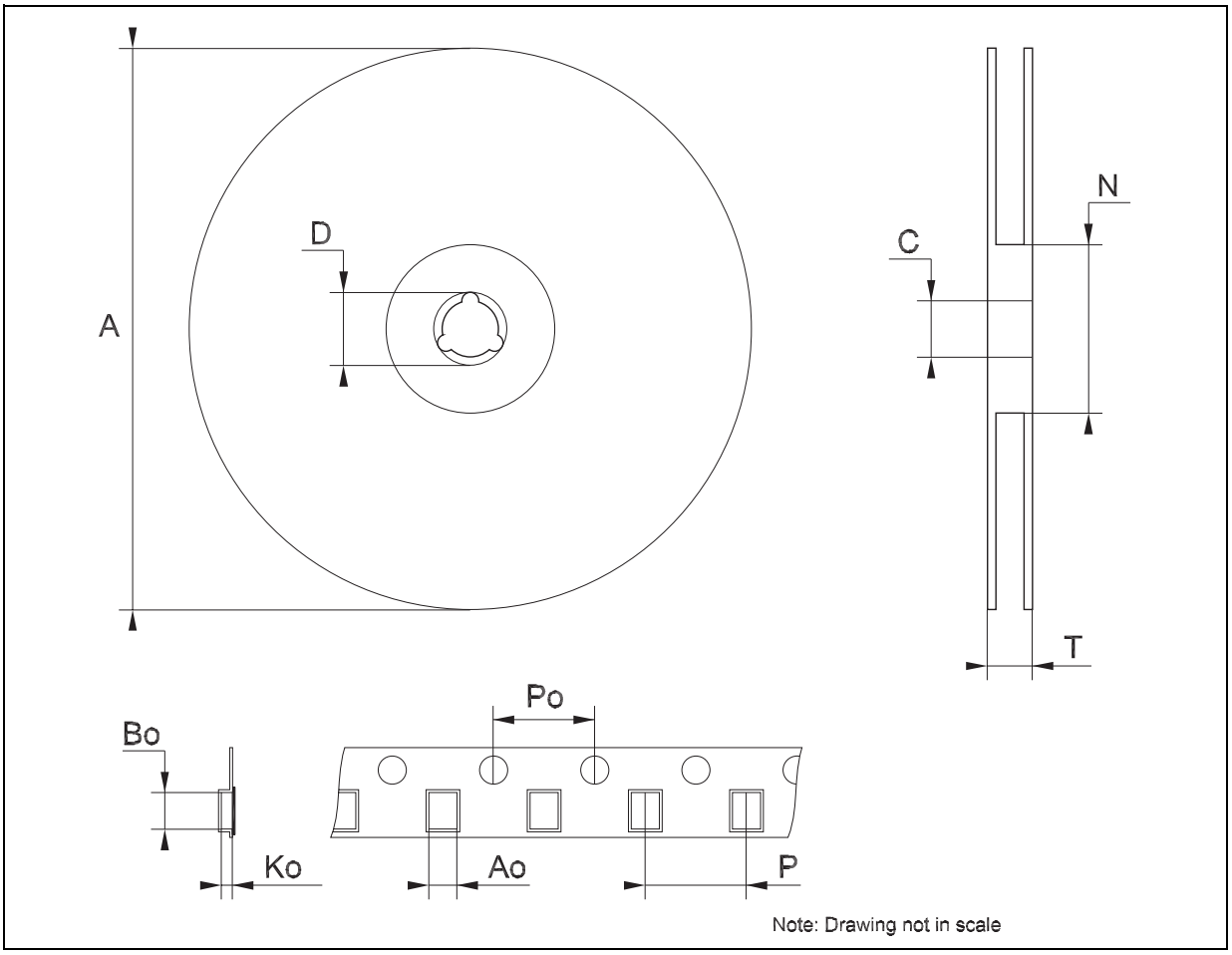
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°



0068772-F

Tape & Reel SO-8 MECHANICAL DATA

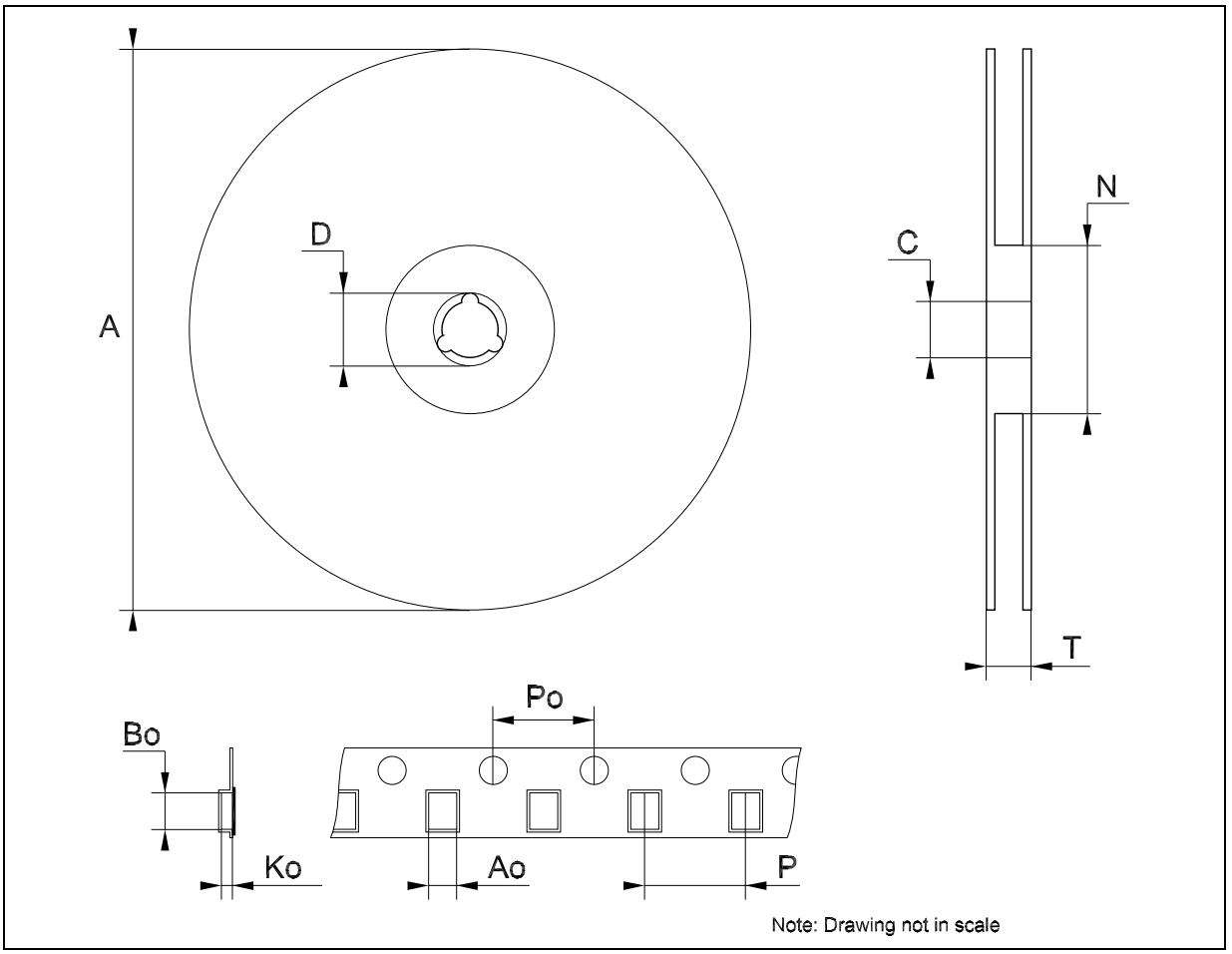
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Note: Drawing not in scale

Tape & Reel DPAK-PPAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.80	6.90	7.00	0.268	0.272	0.2.76
Bo	10.40	10.50	10.60	0.409	0.413	0.417
Ko	2.55	2.65	2.75	0.100	0.104	0.105
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



Note: Drawing not in scale

6 Order code

Table 12. Order code

Part numbers	Packages		Output voltage
	SO-8 (T&R)	DPAK (T&R)	
KF15	KF15BD-TR	KF15BDT-TR	1.5 V
KF25	KF25BD-TR	KF25BDT-TR	2.5 V
KF30	KF30BD-TR		3 V
KF33	KF33BD-TR	KF33BDT-TR	3.3 V
KF40	KF40BD-TR	KF40BDT-TR	4 V
KF50	KF50BD-TR	KF50BDT-TR	5 V
KF52	KF52BD-TR		5.2 V
KF60	KF60BD-TR		6 V
KF80	KF80BD-TR	KF80BDT-TR	8 V

7 Revision history

Table 13. Revision history

Date	Revision	Changes
06-Jun-2007	9	Order codes has been updated and the document has been reformatted.

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