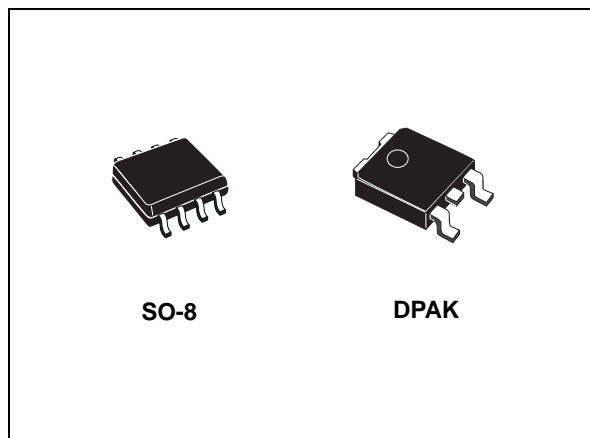


## Very low drop voltage regulators with inhibit

Datasheet - production data



### Description

The KF series are very low drop regulators available in SO-8 and DPAK packages and in a wide range of output voltages.

The very low dropout voltage (0.4 V) and the very low quiescent current make them particularly suitable for low noise, low power applications and especially 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  $\mu\text{F}$  capacitor for stability allowing space and cost saving.

### Features

- Very low dropout voltage (0.4 V)
- Very low quiescent current (typ. 50  $\mu\text{A}$  in OFF mode, 500  $\mu\text{A}$  in ON mode)
- Output current up to 500 mA
- Logic-controlled electronic shutdown
- Output voltages of 2.5; 3.3; 5; 8 V
- Internal current and thermal limit
- Only 2.2  $\mu\text{F}$  for stability
- Available in  $\pm 2\%$  accuracy at 25  $^{\circ}\text{C}$
- Supply voltage rejection: 70 db (typ.)
- Temperature range: - 40 to 125  $^{\circ}\text{C}$

**Table 1. Device summary**

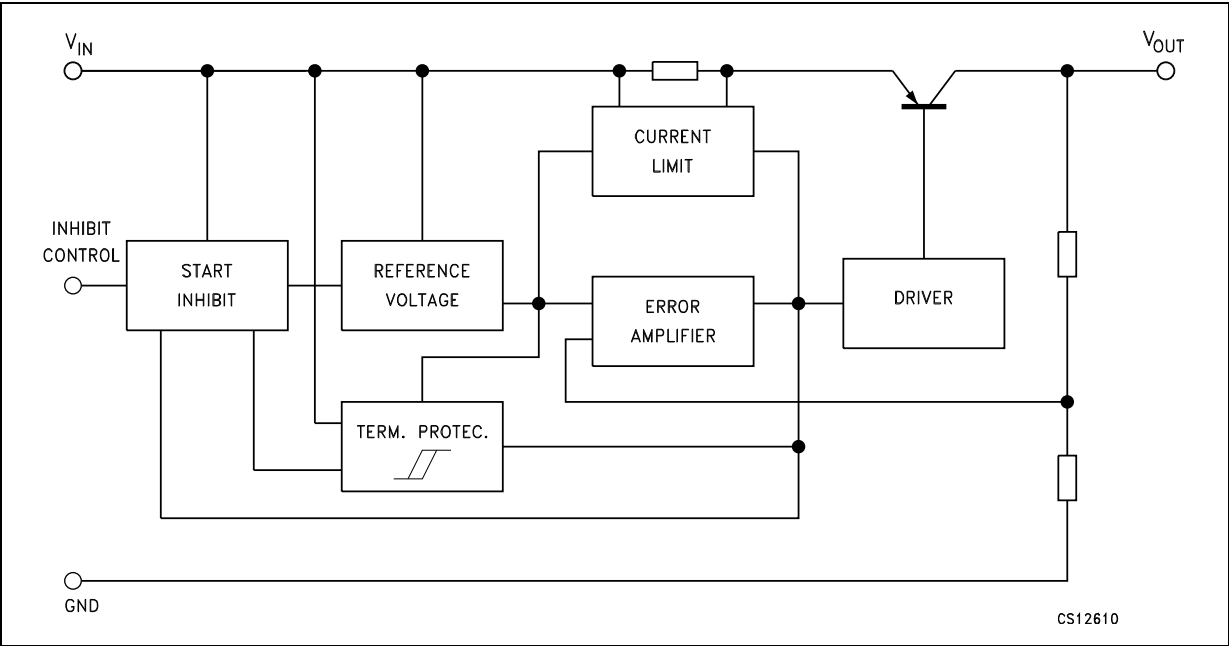
Order codes		Output voltages
SO-8 (tape and reel)	DPAK (tape and reel)	
KF25BD-TR	KF25BDT-TR	2.5 V
KF33BD-TR	KF33BDT-TR	3.3 V
KF50BD-TR	KF50BDT-TR	5 V
	KF80BDT-TR	8 V

# Contents

1	Diagram .....	3
2	Pin configuration .....	4
3	Maximum ratings .....	5
4	Electrical characteristics .....	6
5	Typical performance characteristics .....	10
6	Package mechanical data .....	11
7	Packaging mechanical data .....	17
8	Revision history .....	20

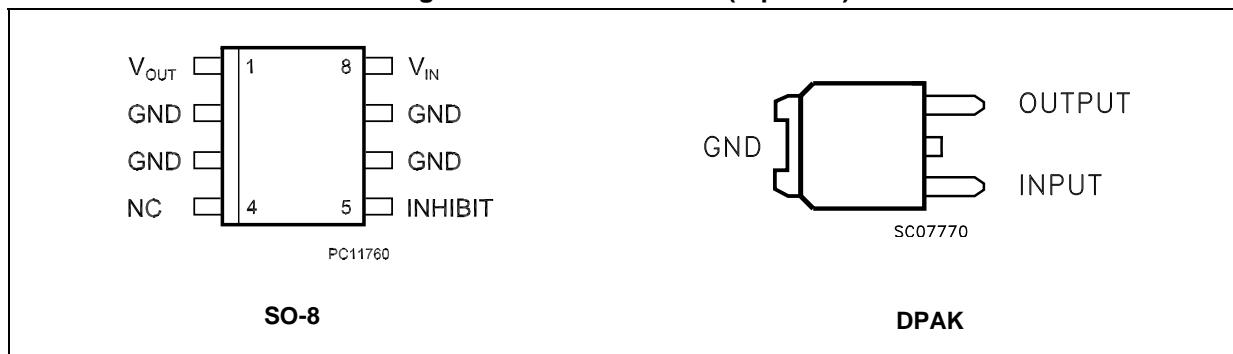
# 1 Diagram

Figure 1. Schematic diagram



## 2 Pin configuration

Figure 2. Pin connections (top view)



### 3 Maximum ratings

Table 2. Absolute maximum ratings

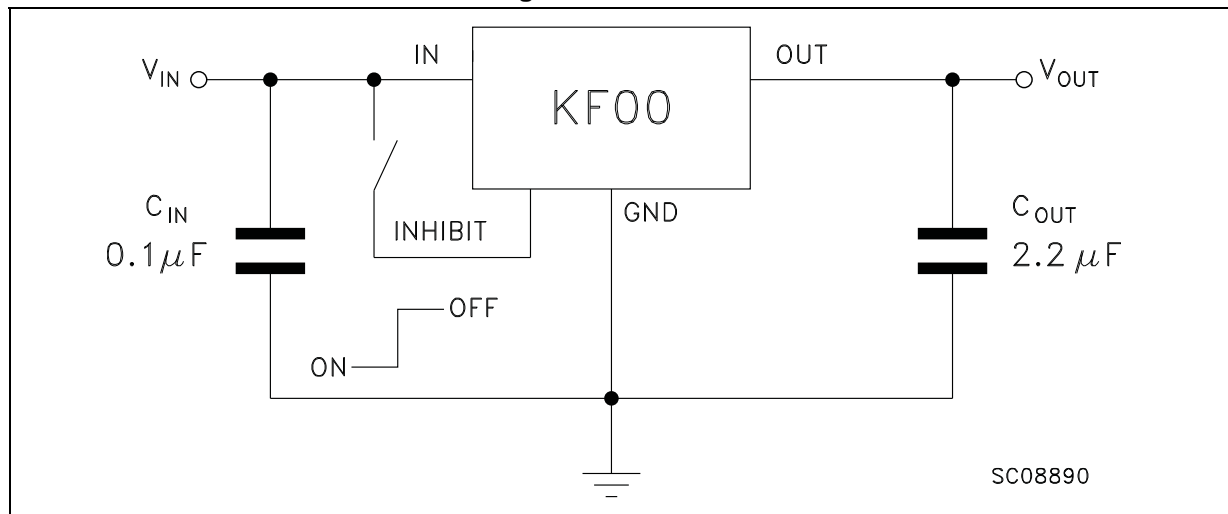
Symbol	Parameter	Value	Unit
$V_I$	DC input voltage	- 0.5 to 20	V
$I_O$	Output current	Internally Limited	
$P_{TOT}$	Power dissipation	Internally Limited	
$T_{STG}$	Storage temperature range	- 40 to 150	°C
$T_{OP}$	Operating junction temperature range	- 40 to 125	°C

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

Table 3. Thermal data

Symbol	Parameter	DPAK	SO-8	Unit
$R_{thJC}$	Thermal resistance junction-case	8	20	°C/W
$R_{thJA}$	Thermal resistance junction-ambient	100	55	°C/W

Figure 3. Test circuit



## 4 Electrical characteristics

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 4. Electrical characteristics ( $V_O = 2.5\text{ V}$ )**

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

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 5. Electrical characteristics ( $V_O = 3.3\text{ V}$ )**

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

Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

**Table 6. Electrical characteristics ( $V_O = 5\text{ V}$ )**

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



Refer to the test circuits,  $T_J = 25\text{ }^\circ\text{C}$ ,  $C_I = 0.1\text{ }\mu\text{F}$ ,  $C_O = 2.2\text{ }\mu\text{F}$  unless otherwise specified.

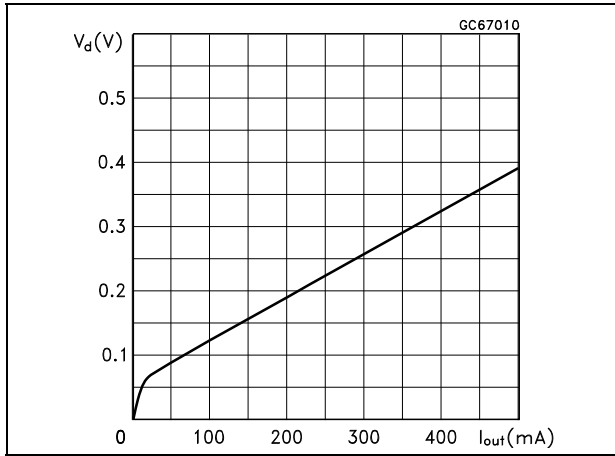
**Table 7. Electrical characteristics ( $V_O = 8\text{ V}$ )**

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

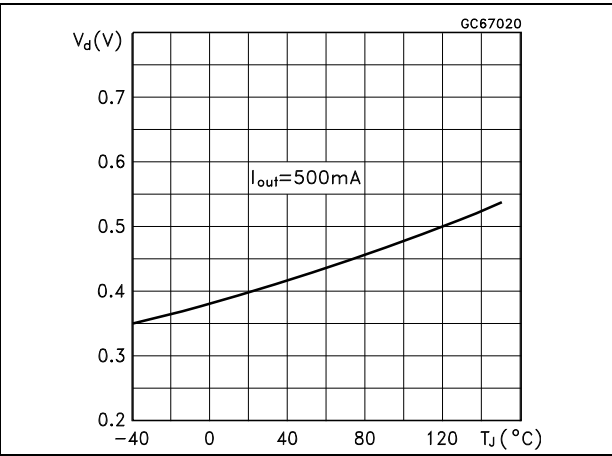
# 5 Typical performance characteristics

Unless otherwise specified  $V_{O(NOM)} = 3.3\text{ V}$ .

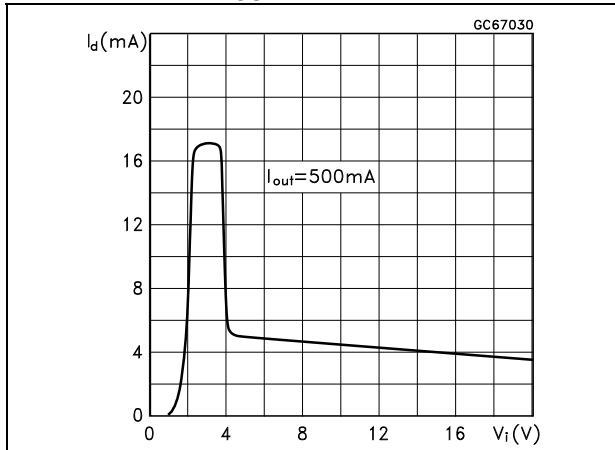
**Figure 4. Dropout voltage vs. output current**



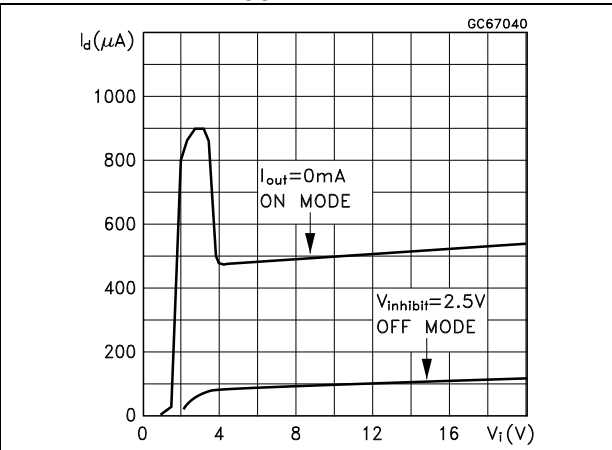
**Figure 5. Dropout voltage vs. temperature**



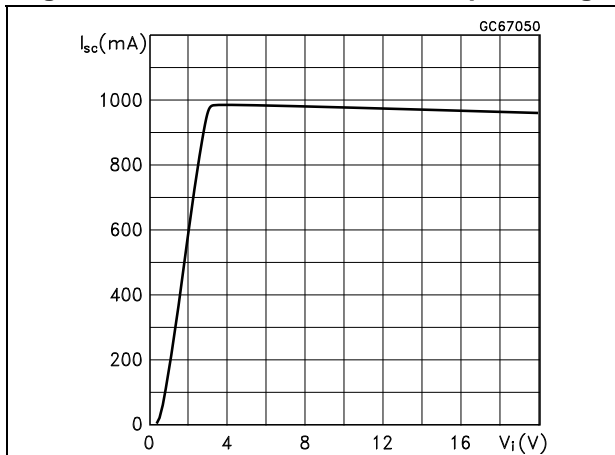
**Figure 6. Supply current vs. input voltage ( $I_{OUT} = 500\text{ mA}$ )**



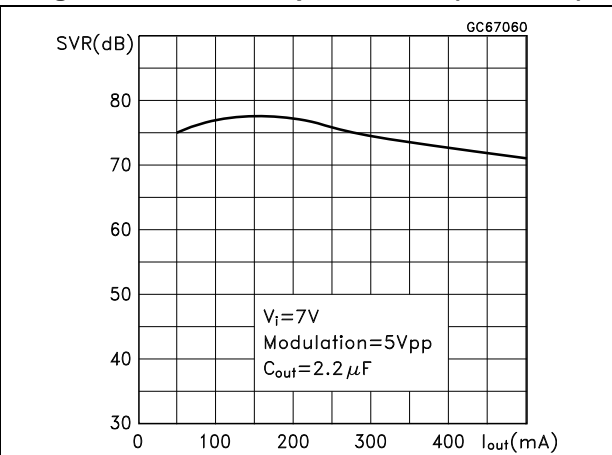
**Figure 7. Supply current vs. input voltage ( $I_{OUT} = 0\text{ mA}$ )**



**Figure 8. Short circuit current vs. input voltage**



**Figure 9. SVR vs. output current ( $f = 120\text{ Hz}$ )**



## 6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Figure 10. DPAK (TO-252) type A drawing

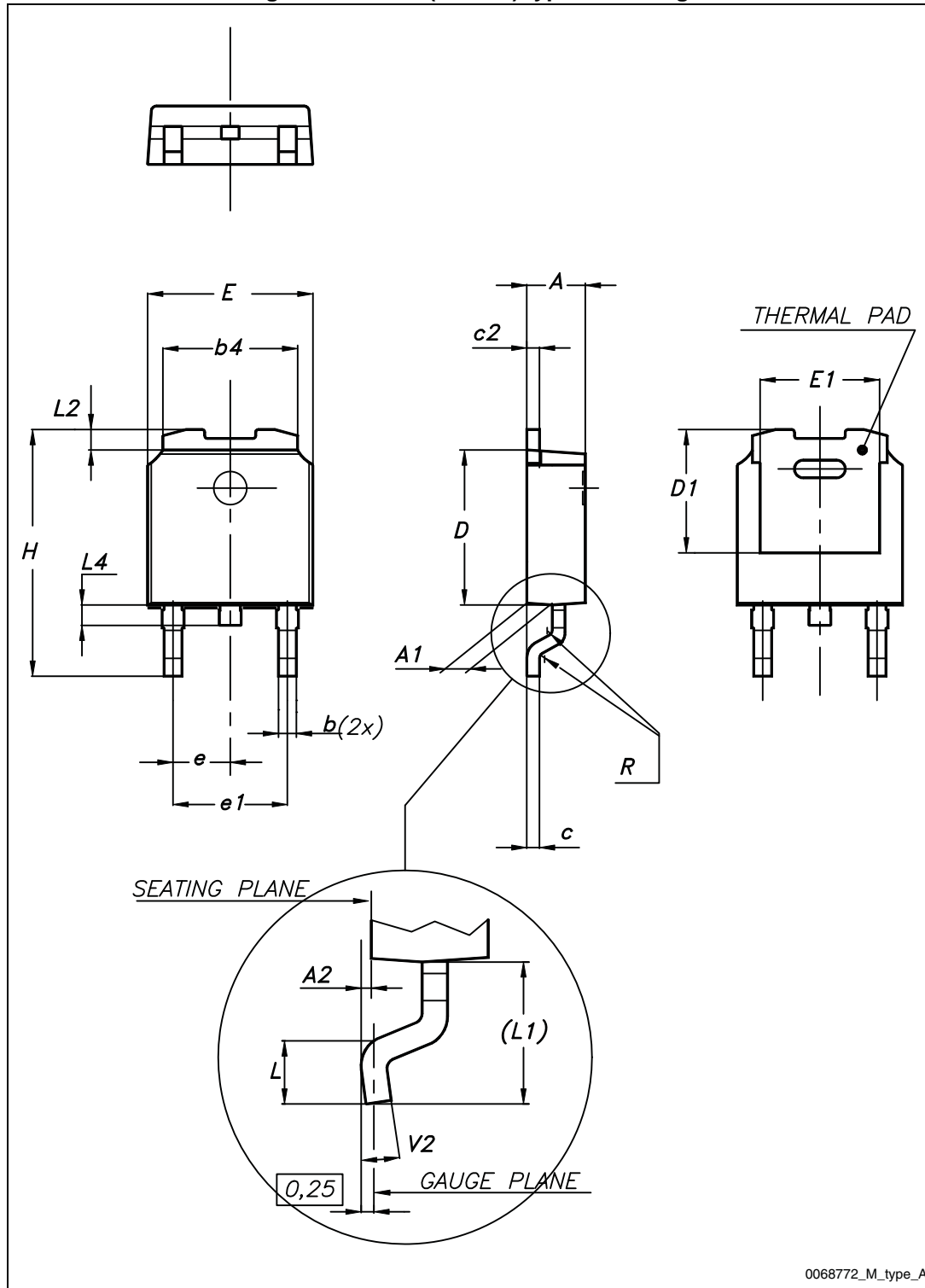
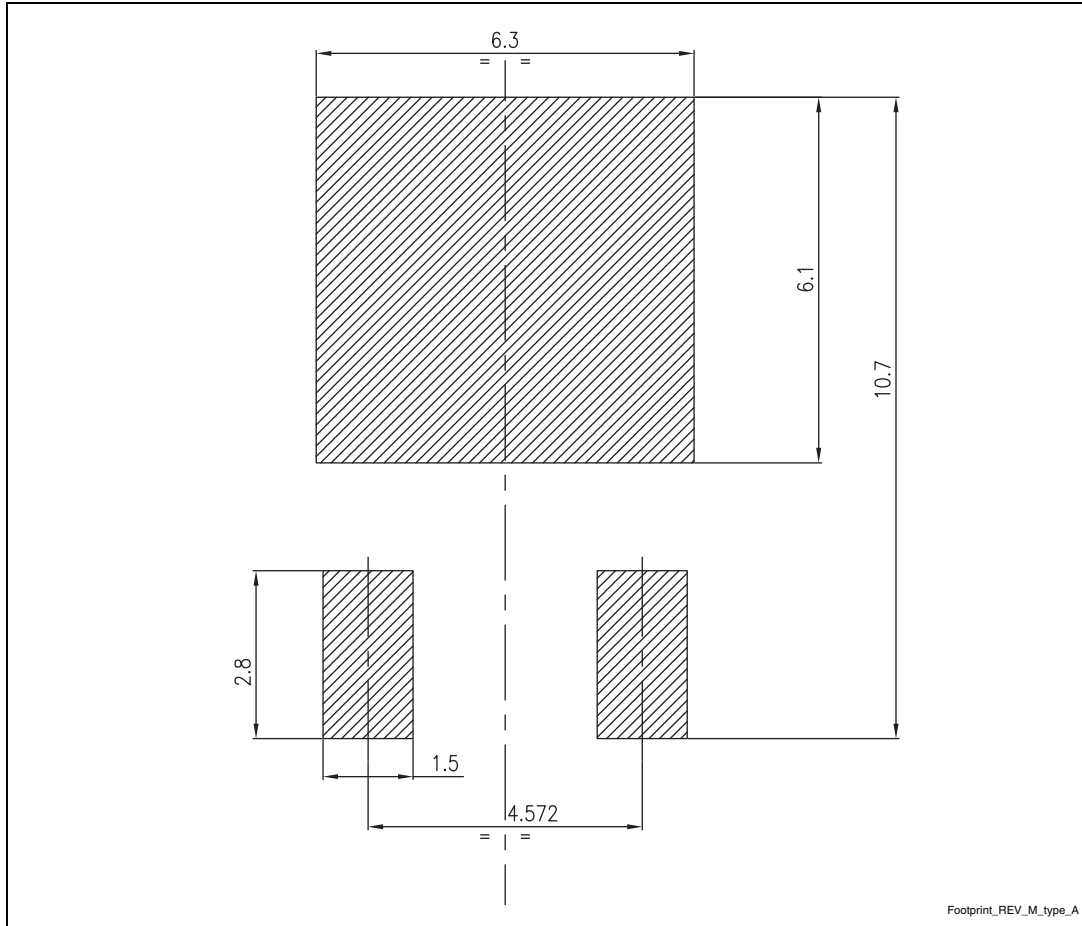


Table 8. DPAK (TO-252) type A mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1.00		1.50
(L1)		2.80	
L2		0.80	
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 11. DPAK (TO-252) type A footprint (a)



a. All dimensions are in millimeters

Figure 12. SO-8 drawing

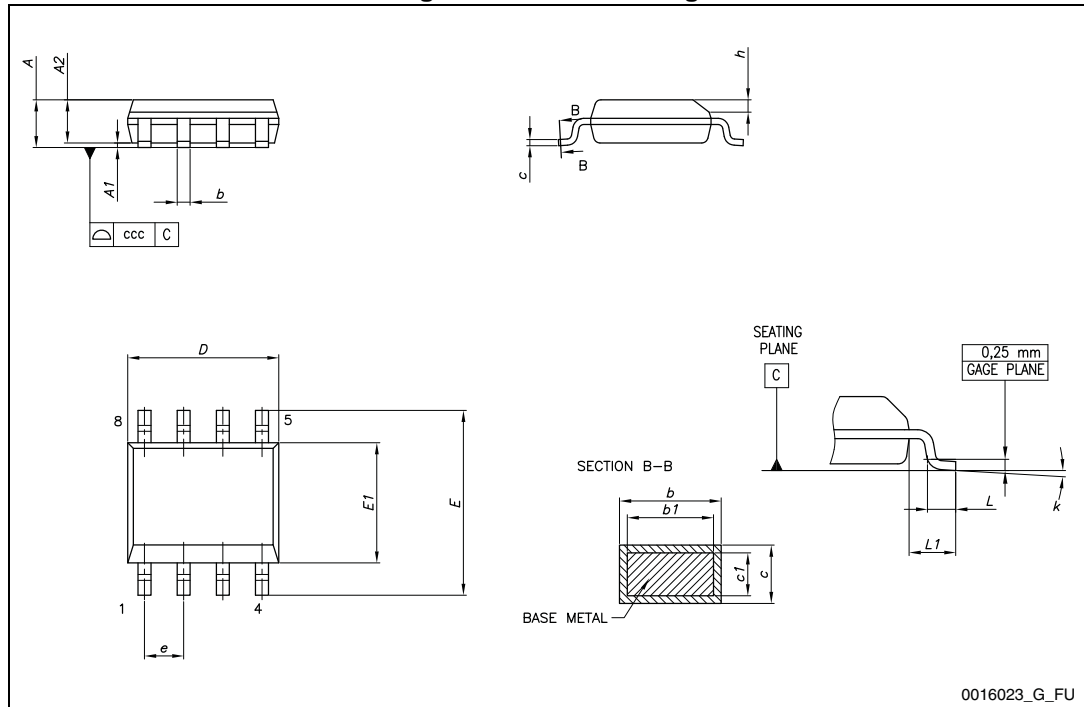


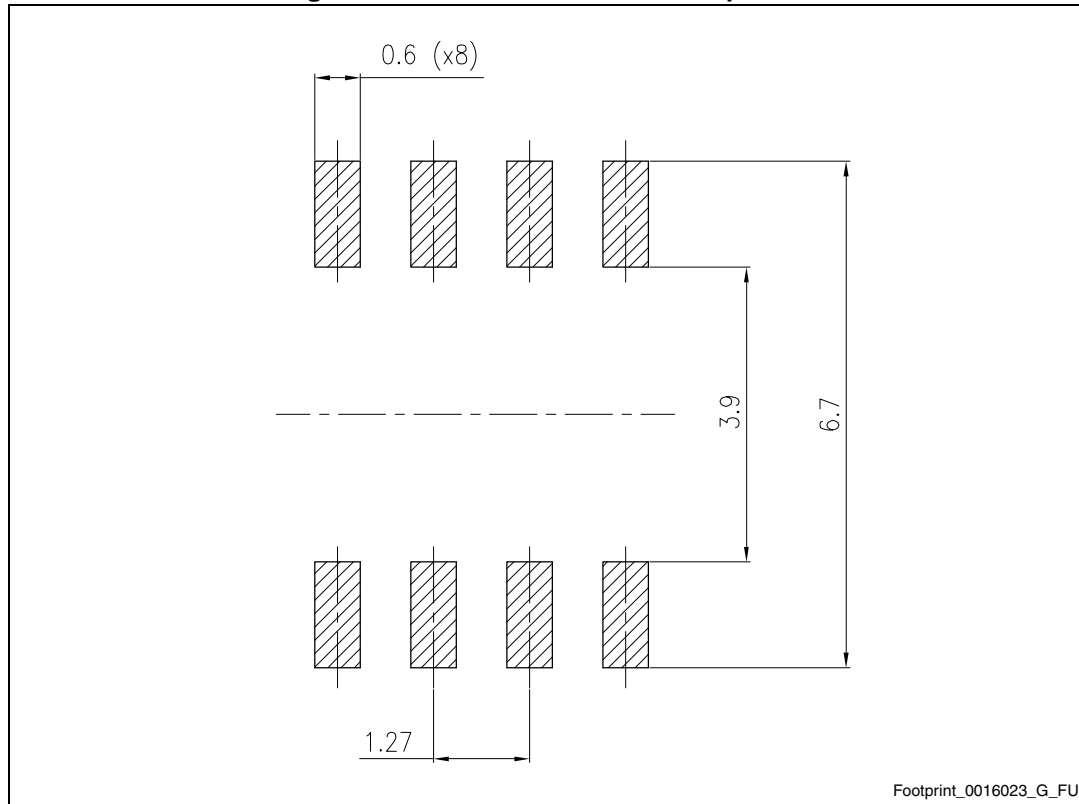
Table 9. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.31		0.51
b1	0.28		0.48
c	0.10		0.25
c1	0.10		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
L2		0.25	

Table 9. SO-8 mechanical data (continued)

Dim.	mm		
	Min.	Typ.	Max.
k	0°		8°
ccc			0.10

Figure 13. SO-8 recommended footprint<sup>(b)</sup>



b. All dimensions are in millimeters.



# 7 Packaging mechanical data

Figure 14. Tape for DPAK (TO-252)

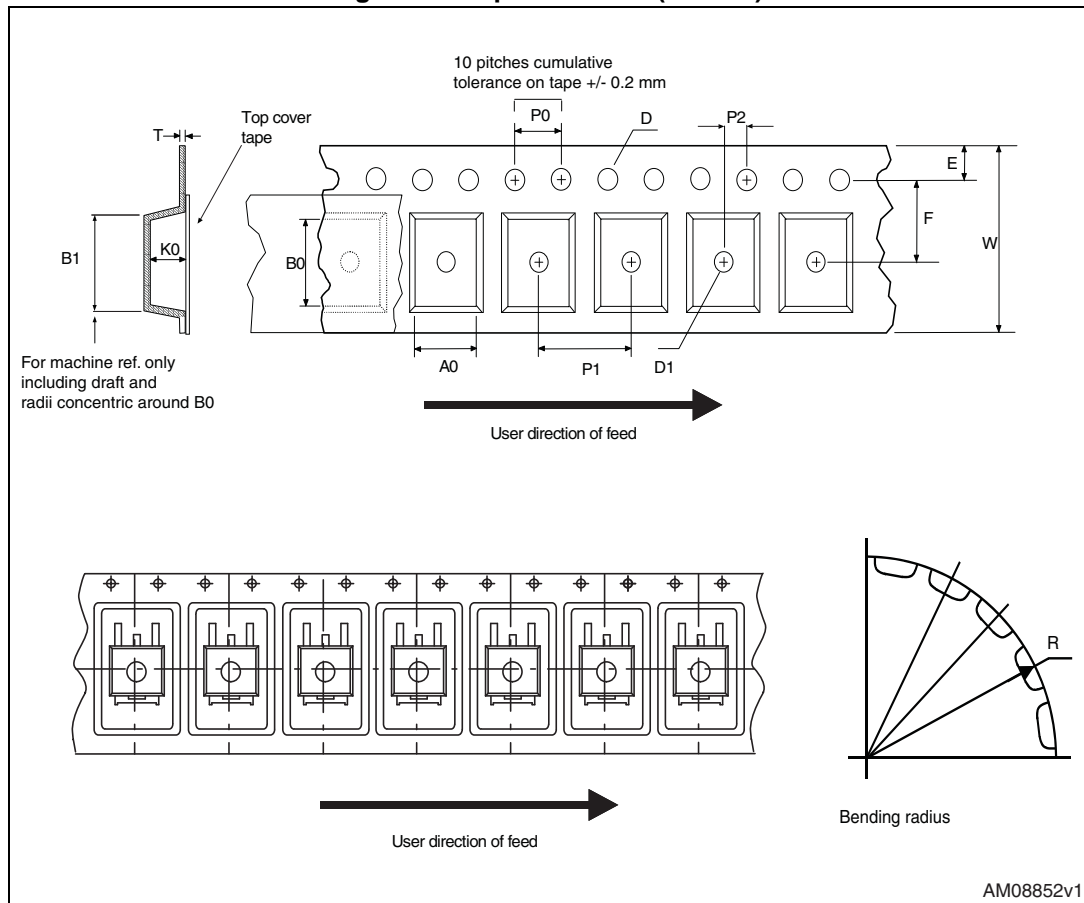


Figure 15. Reel for DPAK (TO-252)

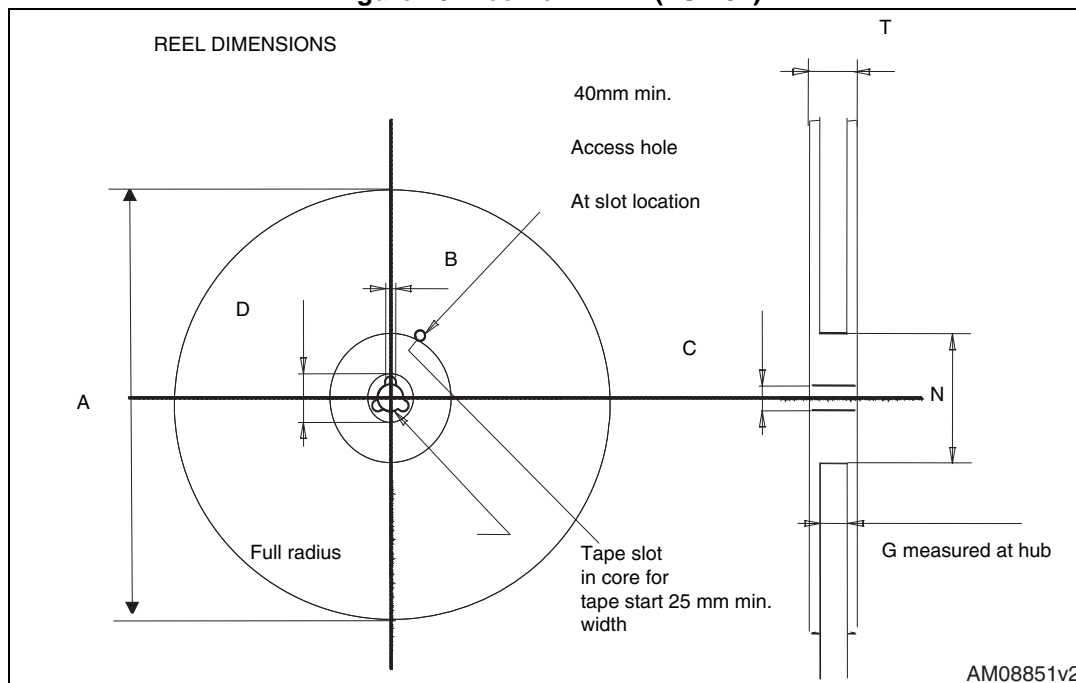


Table 10. DPAK (TO-252) tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		22.4
K0	2.55	2.75			
P0	3.9	4.1		Base qty.	2500
P1	7.9	8.1		Bulk qty.	2500
P2	1.9	2.1			
R	40				
T	0.25	0.35			
W	15.7	16.3			

Figure 16. SO-8 tape and reel dimensions

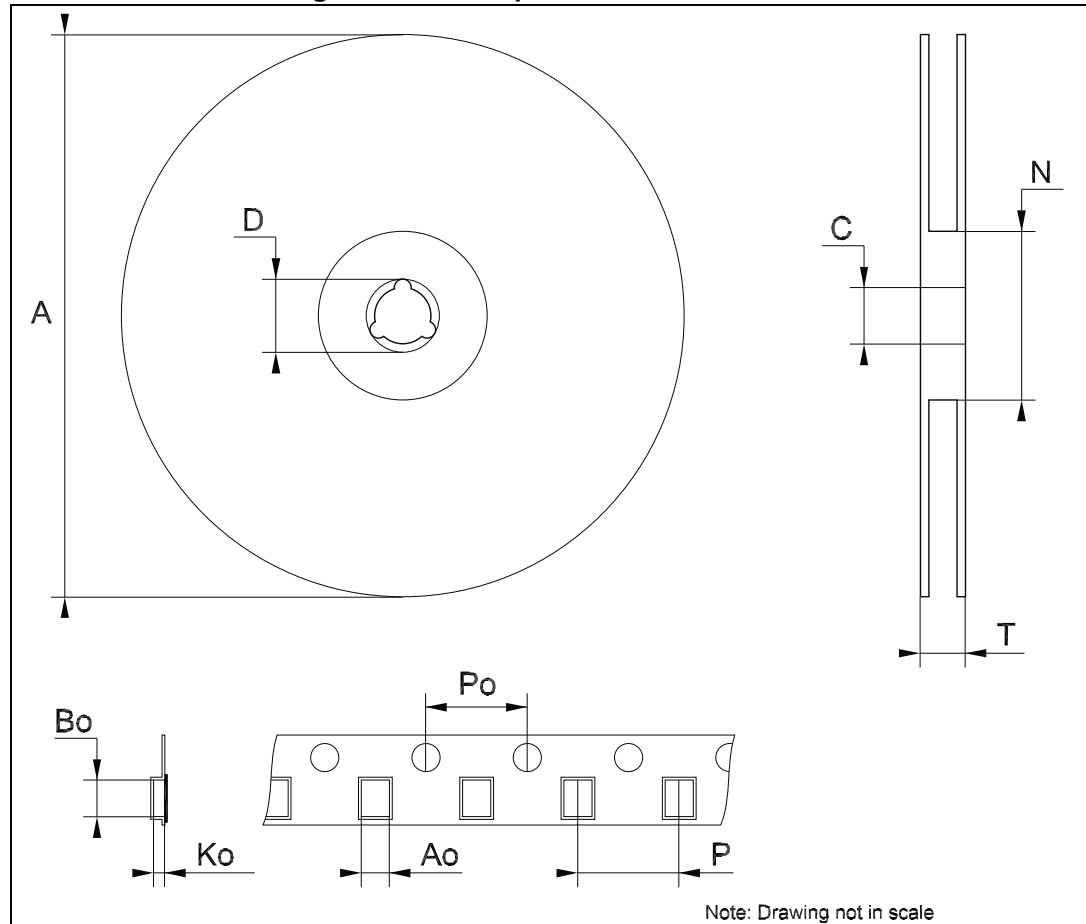


Table 11. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

## 8 Revision history

**Table 12. Document revision history**

Date	Revision	Changes
06-Jun-2007	9	Order codes updated.
14-Dec-2007	10	Modified: Table 1.
21-Feb-2008	11	Modified: Table 1.
23-Oct-2012	12	Change title description in cover page. Updated: Table 1 on page 1. Added: $R_{thJA}$ value for DPAK and SO-8 Table 3 on page 5. Modified: titles Figure 6 and Figure 7 on page 10.
19-Mar-2014	13	The part numbers KF25B, KF33B, KF50B, KF80B changed to KF. Updated Section 6: Package mechanical data and Section 7: Packaging mechanical data. Minor text changes.
16-Feb-2018	14	Minor text changes.

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2018 STMicroelectronics – All rights reserved

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А