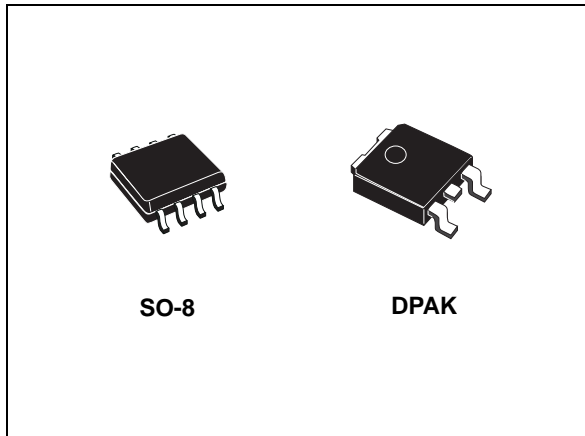


Very low drop voltage regulators with inhibit

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 μF capacitor for stability allowing space and cost saving.

Features

- Very low dropout voltage (0.4 V)
- 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 2.5; 3.3; 5; 8 V
- Internal current and thermal limit
- Only 2.2 μF for stability
- Available in $\pm 2\%$ accuracy at 25 °C
- Supply voltage rejection: 70 db (typ.)
- Temperature range: - 40 to 125 °C

Table 1. Device summary

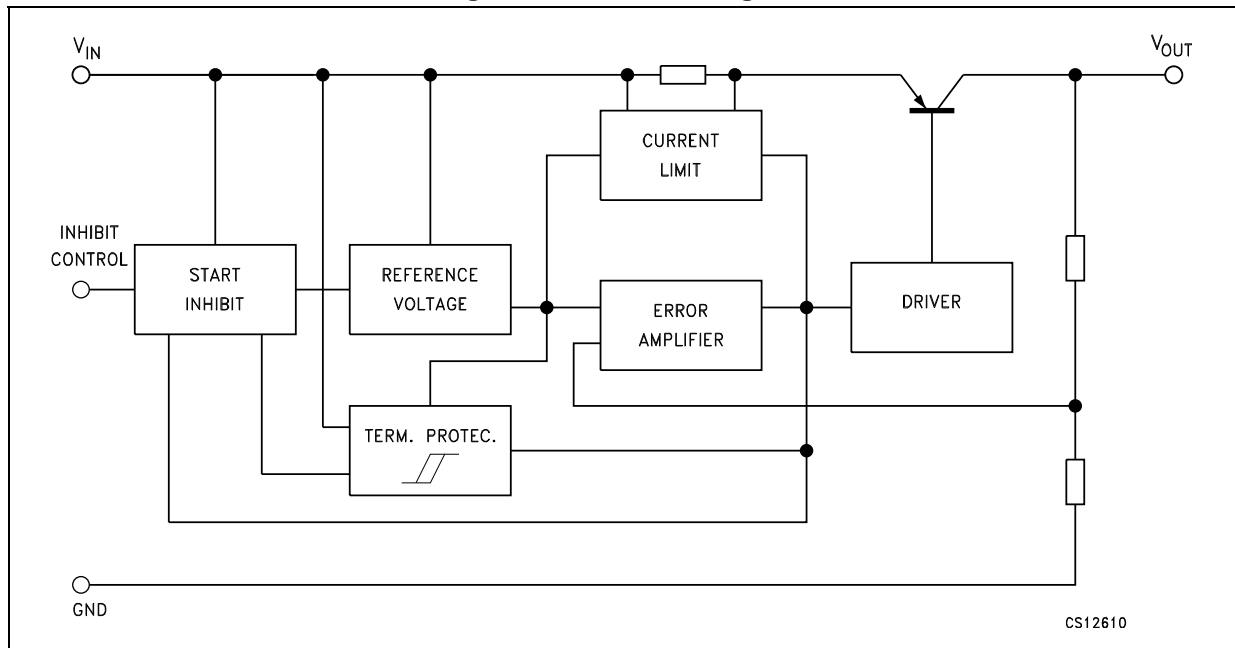
Order codes		Output voltages
SO-8 (tape and reel)	DPAK (tape and reel)	
KF25BD-TR	KF25BDT-TR	2.5 V
KF33BD-TR	KF33BDT-TR	3.3 V
KF50BD-TR	KF50BDT-TR	5 V
	KF80BDT-TR	8 V

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

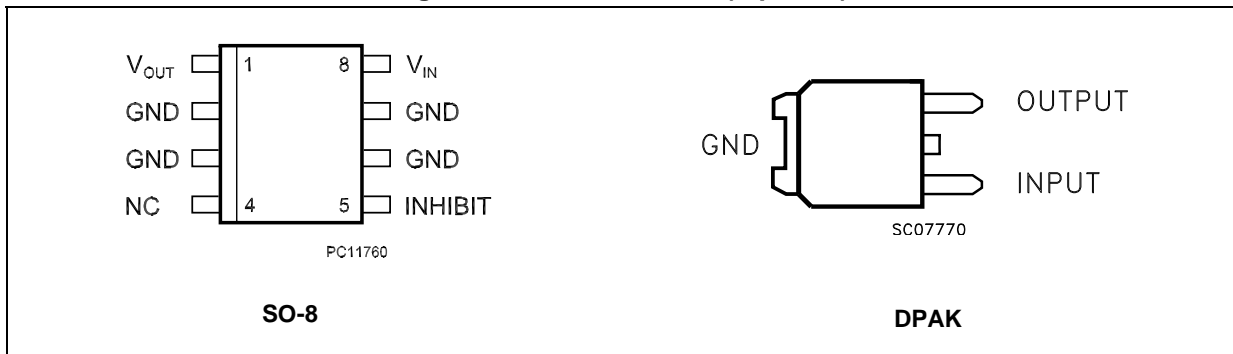
1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)



3 Maximum ratings

Table 2. Absolute maximum ratings

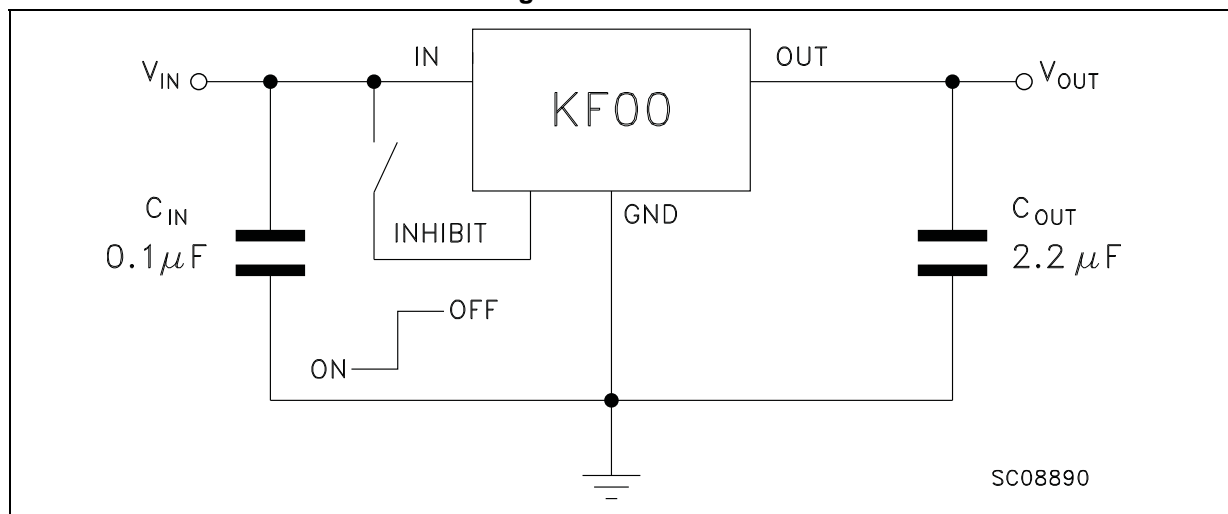
Symbol	Parameter	Value	Unit
V_I	DC input voltage	- 0.5 to 20	V
I_O	Output current	Internally Limited	
P_{TOT}	Power dissipation	Internally Limited	
T_{STG}	Storage temperature range	- 40 to 150	°C
T_{OP}	Operating junction temperature range	- 40 to 125	°C

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, $T_J = 25\text{ °C}$, $C_I = 0.1\text{ }\mu\text{F}$, $C_O = 2.2\text{ }\mu\text{F}$ 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	
		$I_O = 50\text{ mA}$, $V_I = 4.5\text{ V}$, $T_a = -25\text{ to }85\text{ °C}$	2.4		2.6		
V_I	Operating input voltage	$I_O = 500\text{ mA}$			20	V	
I_O	Output current limit			1		A	
ΔV_O	Line regulation	$V_I = 3.5\text{ to }20\text{ V}$, $I_O = 5\text{ mA}$		2	12	mV	
ΔV_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	μA
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		μV	
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	$T_a = -40\text{ to }125\text{ °C}$			0.8	V	
V_{IH}	Control input logic high	$T_a = -40\text{ to }125\text{ °C}$	2			V	
I_I	Control input current	$V_I = 6\text{ V}$, $V_C = 6\text{ V}$		10		μA	
C_O	Output bypass capacitance	$\text{ESR} = 0.1\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }500\text{ mA}$	2	10		μF	

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	
ΔV_O	Line regulation	$V_I = 4.3\text{ to }20\text{ V}$, $I_O = 5\text{ mA}$		2	12	mV	
ΔV_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
		$V_I = 4.6\text{ to }20\text{ V}$, $I_O = 500\text{ mA}$					
		$V_I = 6\text{ V}$					
SVR	Supply voltage rejection	$I_O = 5\text{ mA}$, $V_I = 5.3 \pm 1\text{ V}$		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	$I_O = 200\text{ mA}$		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		μA	
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω , $I_O = 0\text{ to }500\text{ mA}$	2	10		μF	

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
ΔV_O	Line regulation	$V_I = 6\text{ to }20\text{ V}$, $I_O = 5\text{ mA}$		3	18	mV
ΔV_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	μA
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		μV
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		μA
C_O	Output bypass capacitance	$\text{ESR} = 0.1\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }500\text{ mA}$	2	10		μF

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
ΔV_O	Line regulation	$V_I = 9\text{ to }20\text{ V}$, $I_O = 5\text{ mA}$		4	24	mV
ΔV_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	μA
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		μV
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		μA
C_O	Output bypass capacitance	$\text{ESR} = 0.1\text{ to }10\text{ }\Omega$, $I_O = 0\text{ to }500\text{ mA}$	2	10		μF

5 Typical performance characteristics

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

Figure 4. Dropout voltage vs. output current

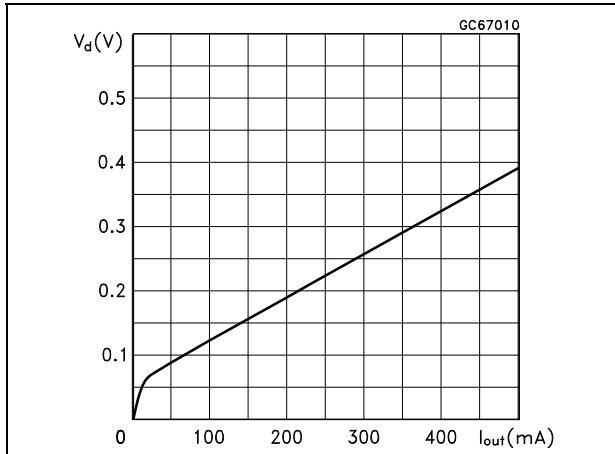


Figure 5. Dropout voltage vs. temperature

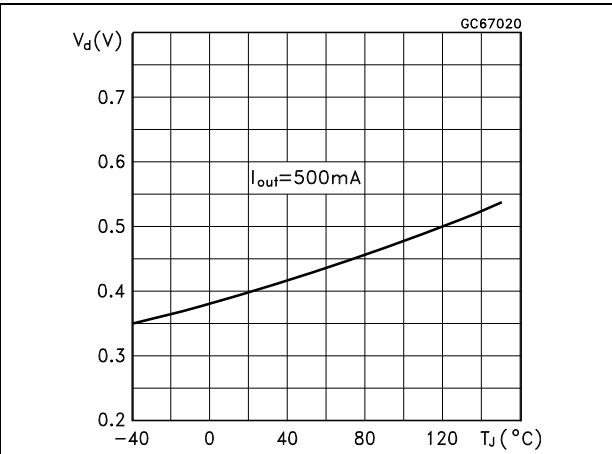


Figure 6. Supply current vs. input voltage ($I_{OUT} = 500\text{ mA}$)

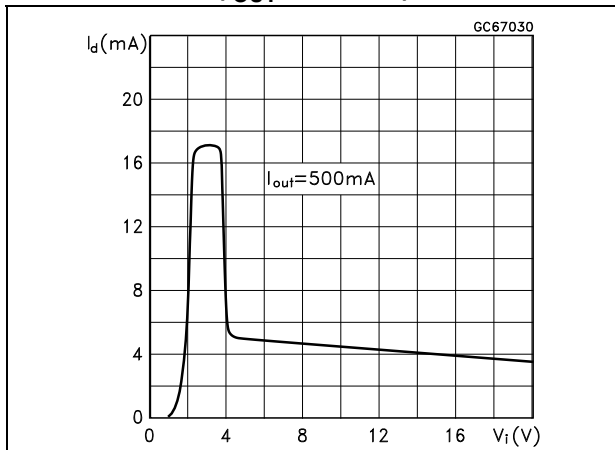


Figure 7. Supply current vs. input voltage ($I_{OUT} = 0\text{ mA}$)

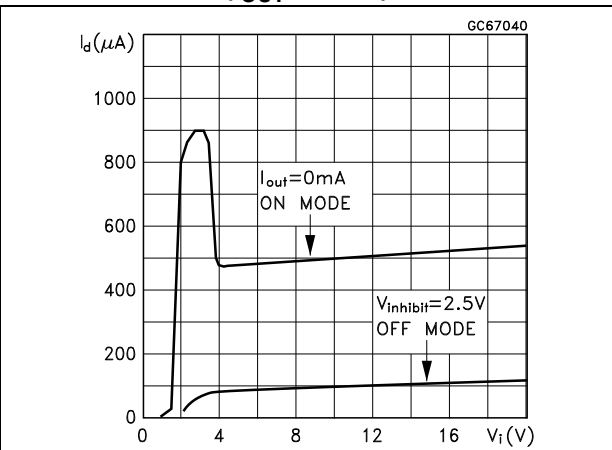


Figure 8. Short circuit current vs. input voltage

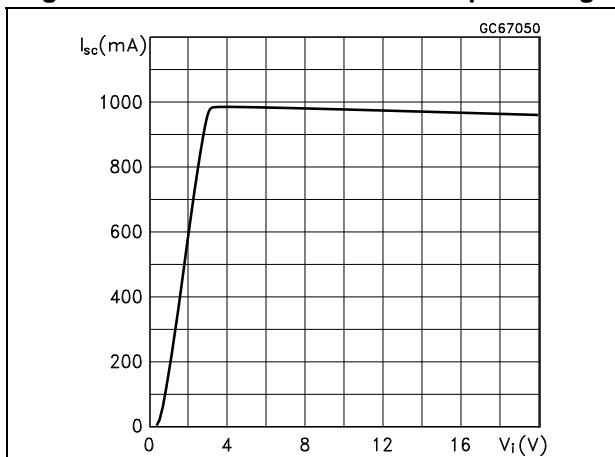
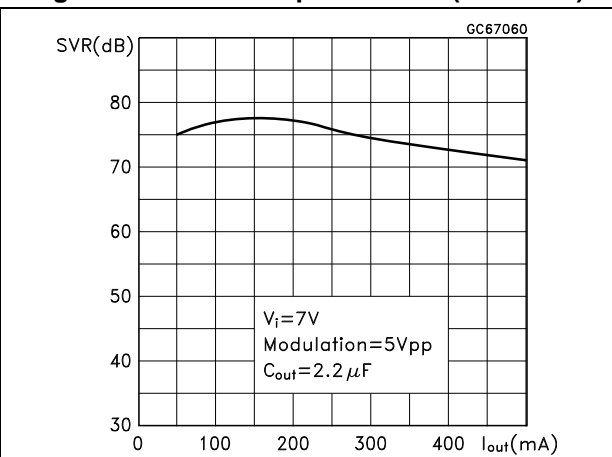


Figure 9. SVR vs. output current ($f = 120\text{ Hz}$)



6 Package mechanical data

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

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

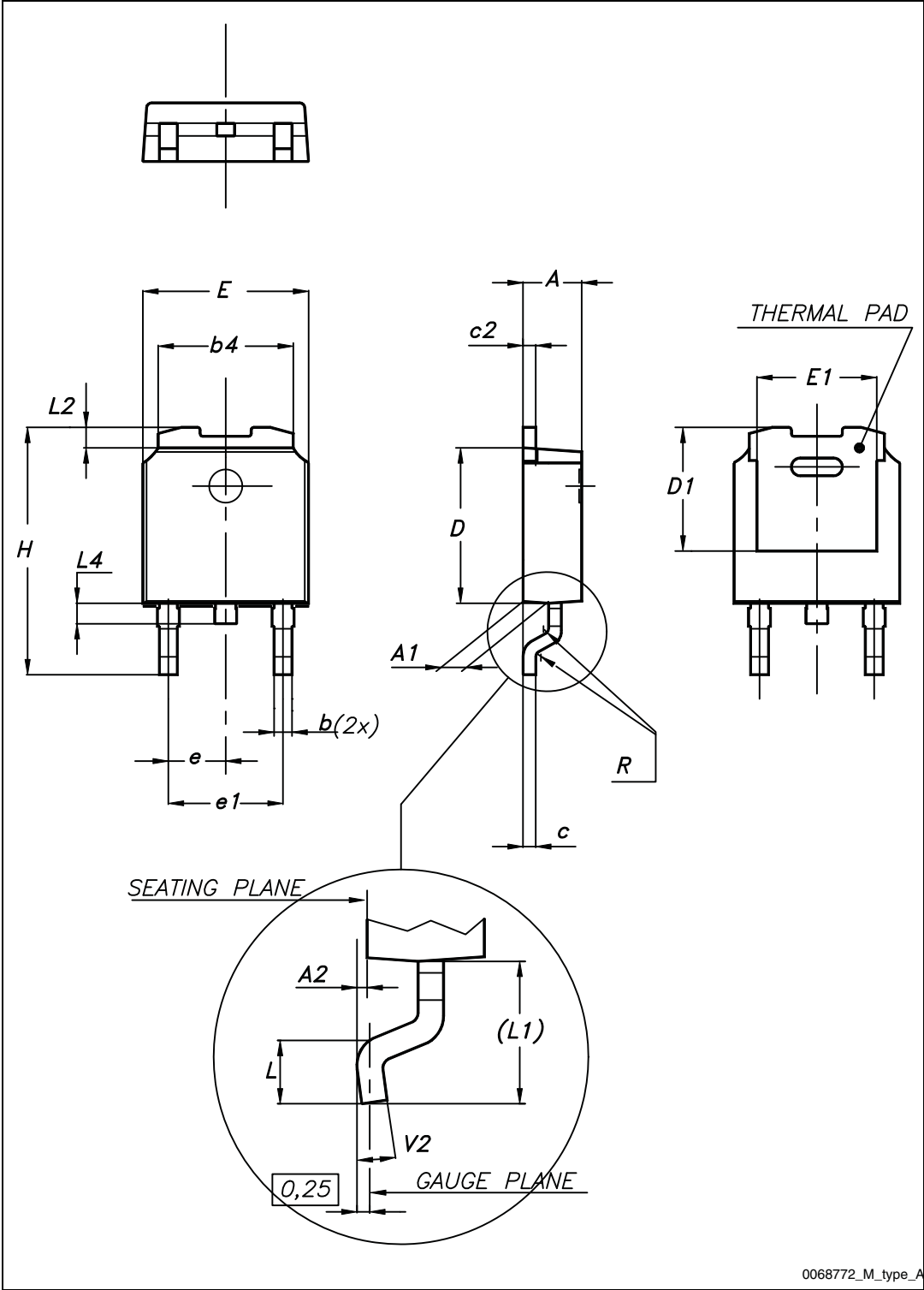
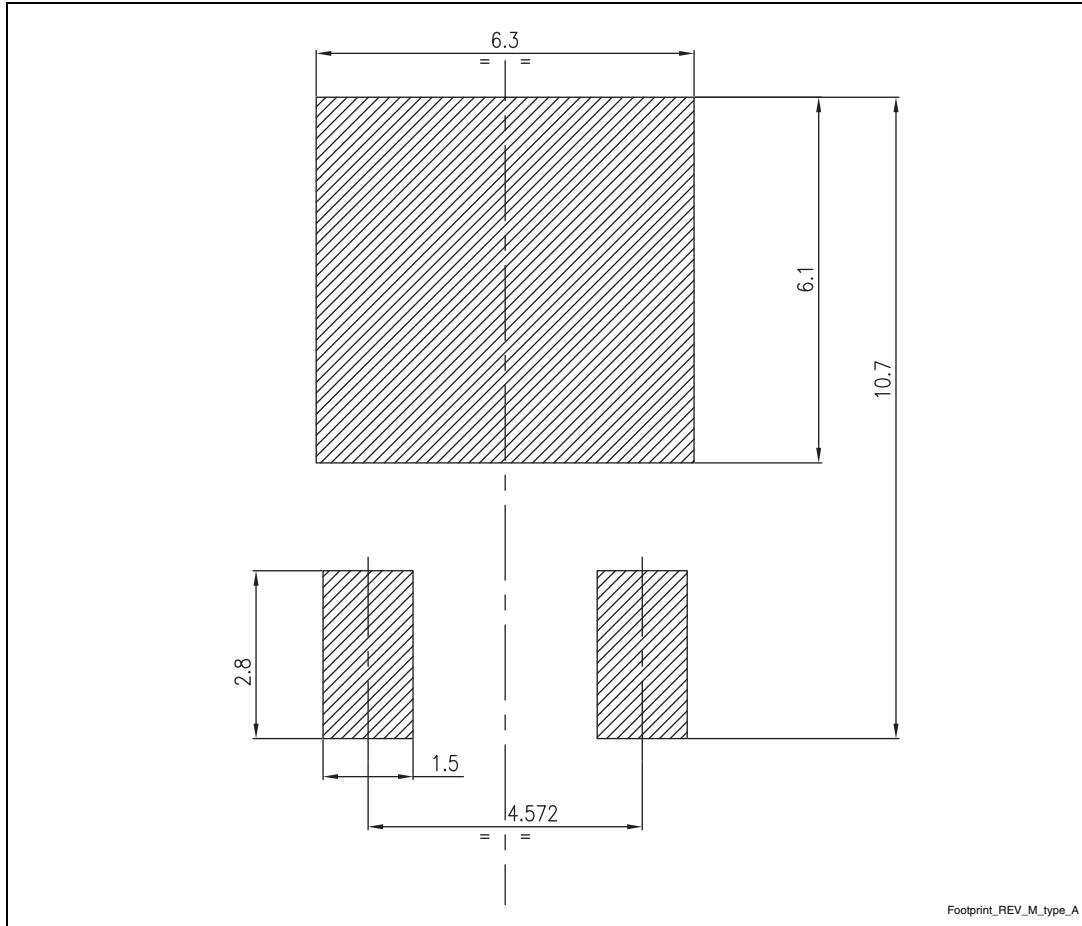


Table 8. DPAK (TO-252) type A mechanical data

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

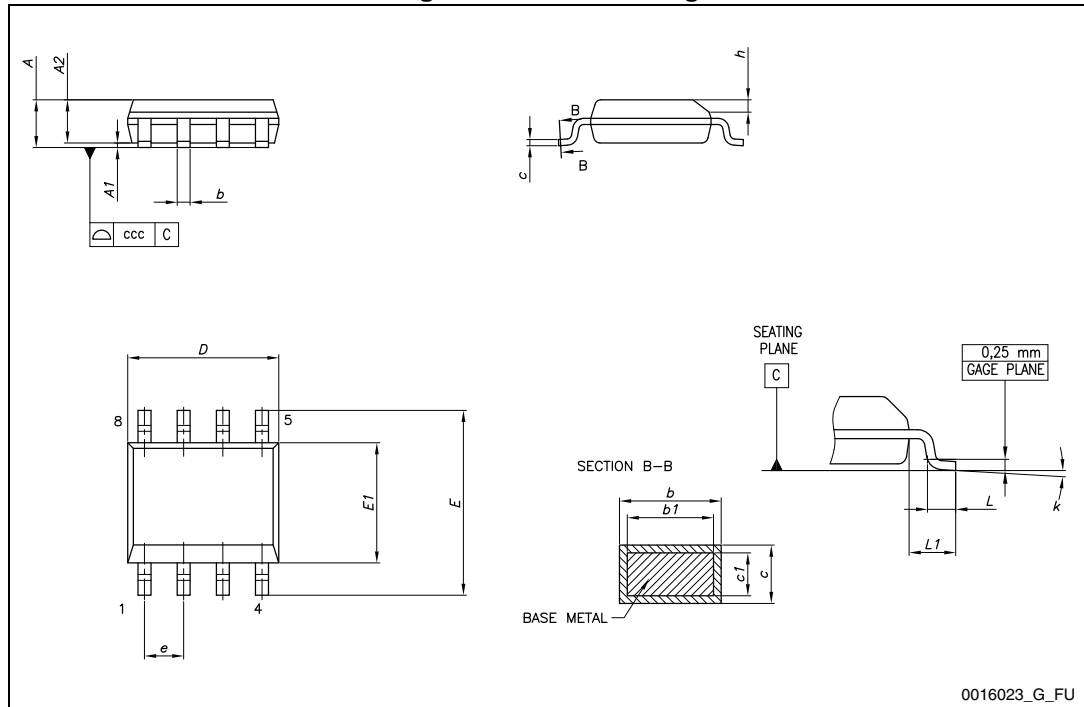


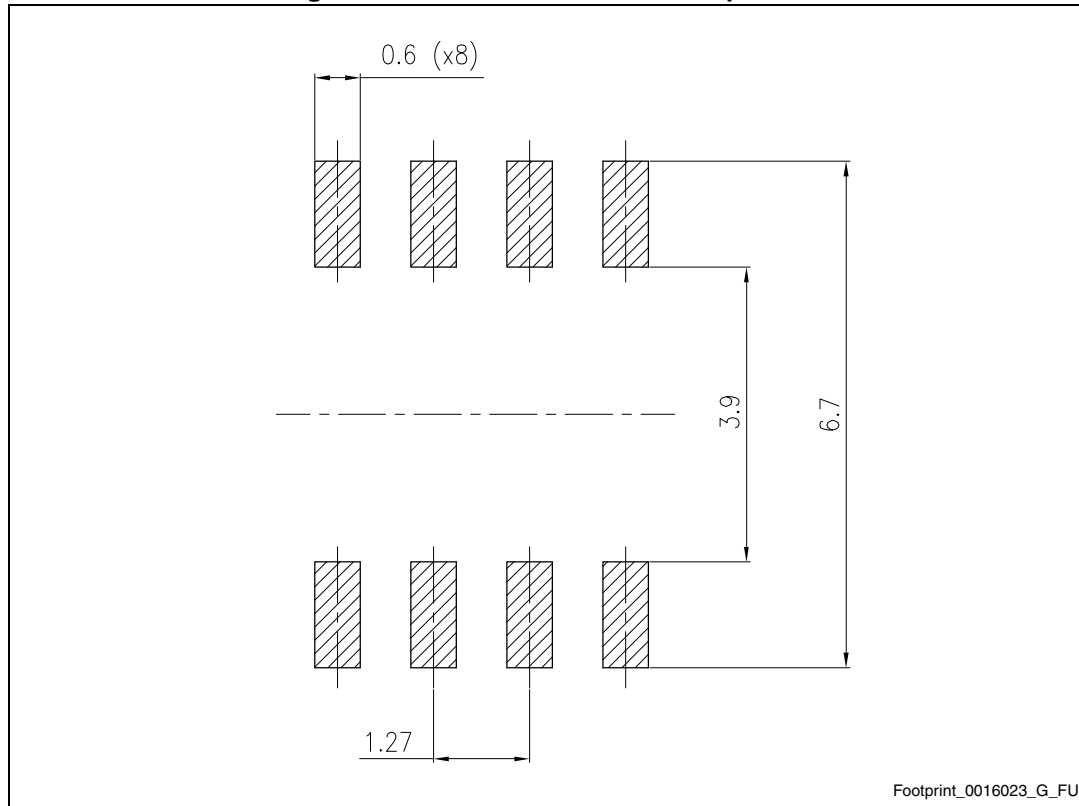
Table 9. SO-8 mechanical data

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^(b)

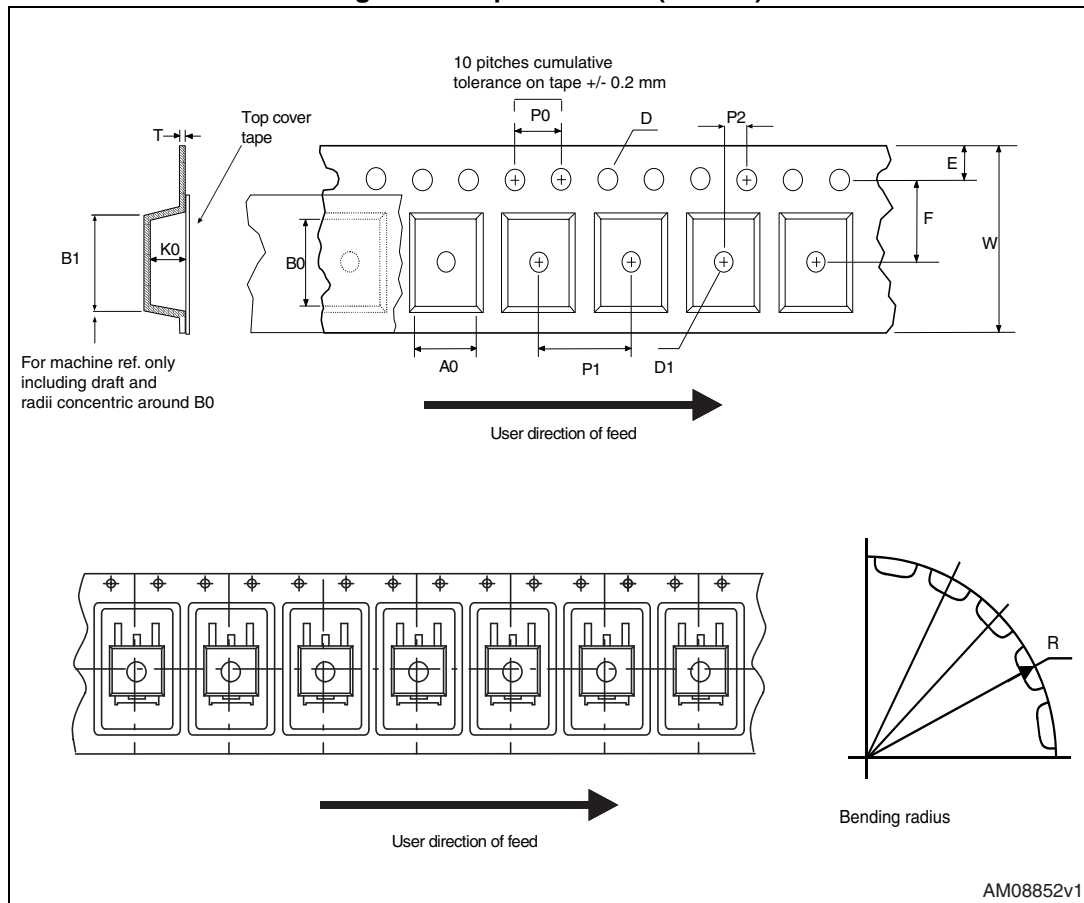


Footprint_0016023_G_FU

b. All dimensions are in millimeters.

7 Packaging mechanical data

Figure 14. Tape for DPAK (TO-252)



AM08852v1

Figure 15. Reel for DPAK (TO-252)

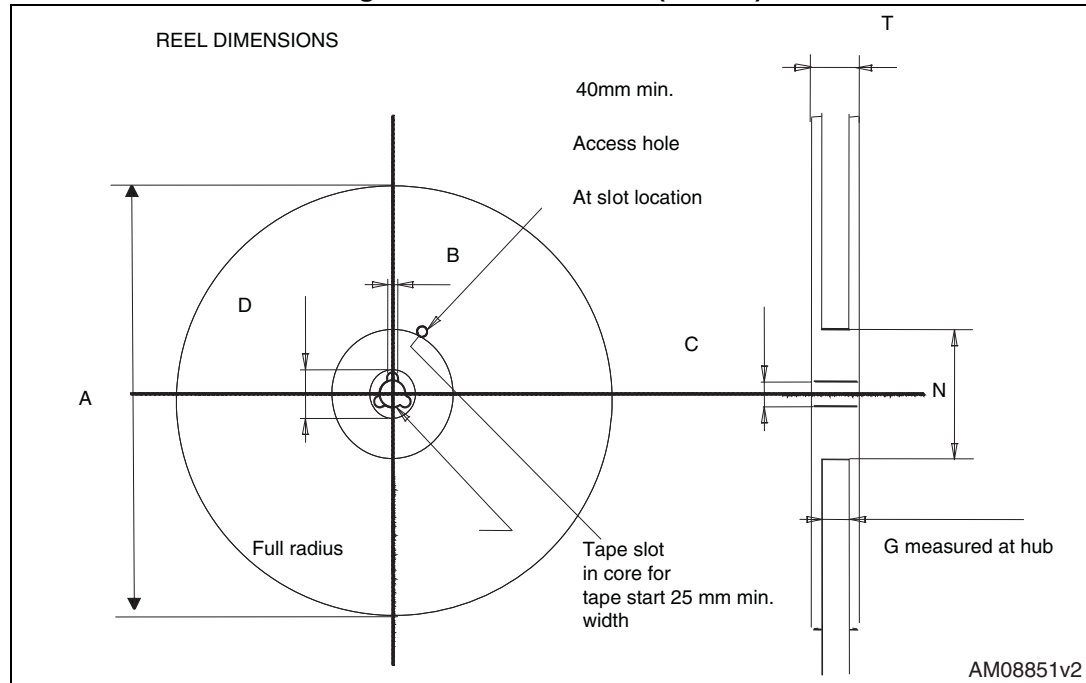


Table 10. DPAK (TO-252) tape and reel mechanical data

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

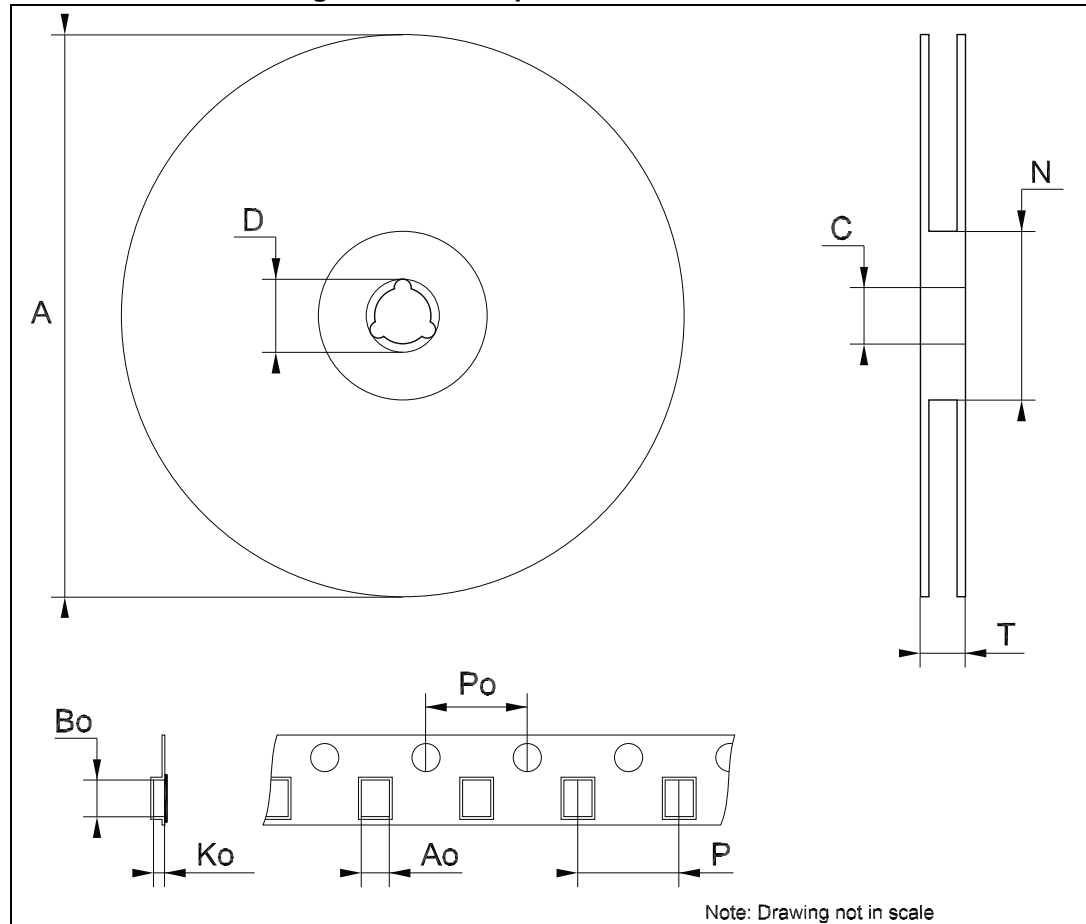


Table 11. SO-8 tape and reel mechanical data

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 «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.