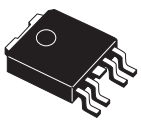
LD29080 series

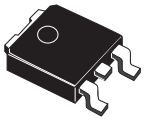
800mA Fixed and adjustable output very low drop voltage regulator

Features

- Very low dropout voltage (Typ. 0.4 at 800mA)
- Guaranteed output current up to 800mA
- Fixed and adjustable output voltage (±1% at 25°C)
- Internal current and thermal limit
- Logic controlled electronic shutdown



PPAK



DPAK

Description

The LD29080 is a high current, high accuracy, low-dropout voltage regulators series. These regulators feature 400mV dropout voltages and very low ground current. Designed for high current loads, these devices also find applications in lower current, extremely low dropout-critical systems, where their tiny dropout voltage and ground current values are important attributes. Typical application are in Power supply switching post regulation, Series power supply for monitors, Series power supply for VCRs and TVs, Computer Systems and Battery powered systems.

Order codes

Part numbers		Output voltage
Packages		
DPAK (T&R)	PPAK (T&R)	
LD29080DT15R	LD29080PT15R	1.5 V
LD29080DT18R	LD29080PT18R	1.8 V (1)
LD29080DT25R	LD29080PT25R	2.5 V
LD29080DT33R	LD29080PT33R	3.3 V
LD29080DT50R	LD29080PT50R	5.0 V
LD29080DT80R	LD29080PT80R	8.0 V (1)
	LD29080PTR	ADJ

1. Available on request.

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Contents

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1 Diagram

Figure 1. Schematic diagram for adjustable version

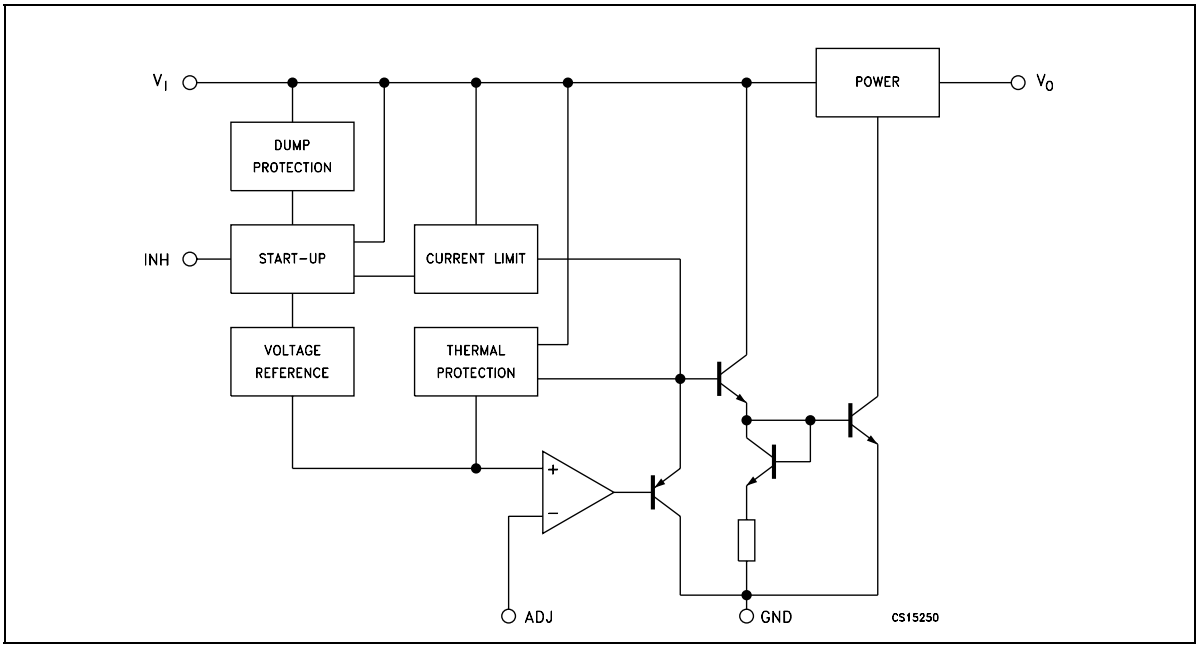
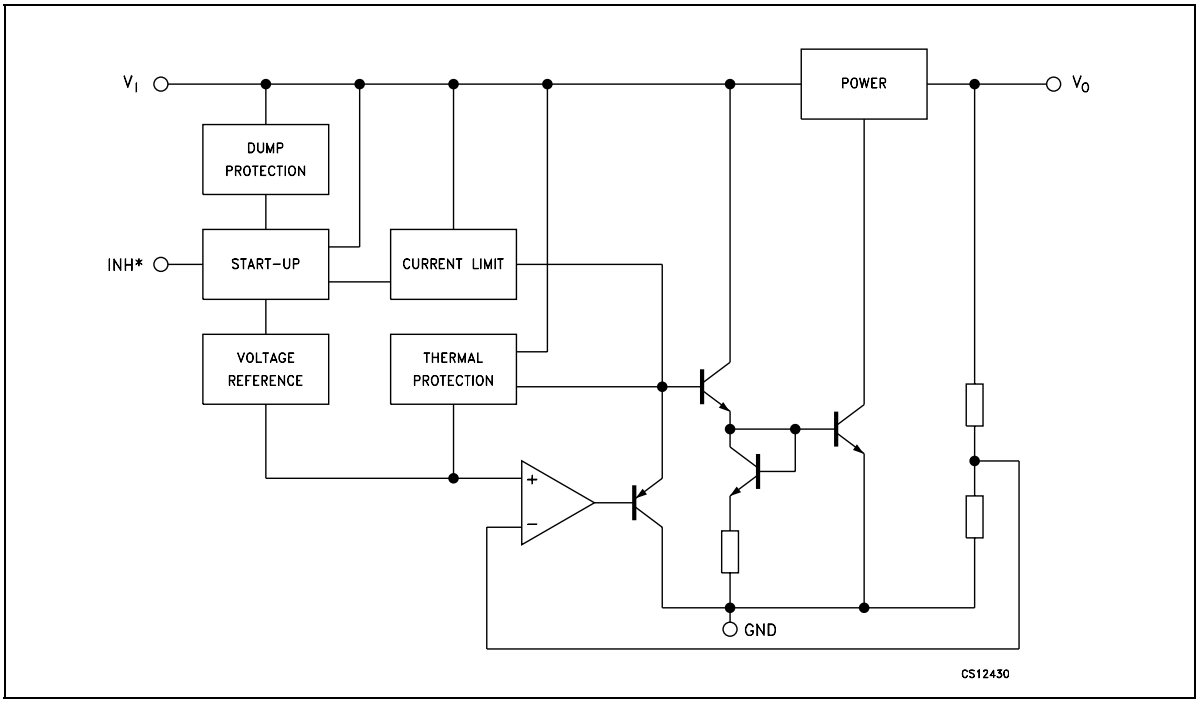


Figure 2. Schematic diagram for fixed version



* Only for version with inhibit function.

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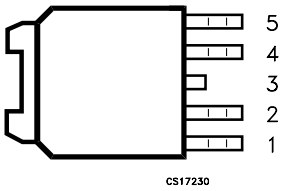
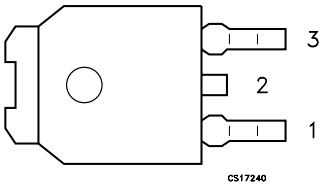
2 Pin configuration

Figure 3. Pin connections (top view)



PPAK



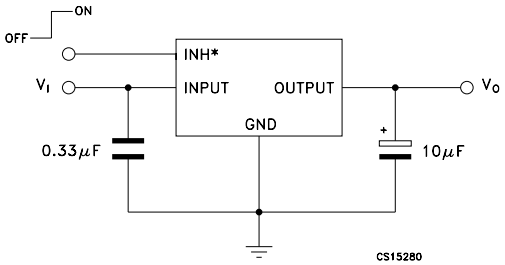
DPAK

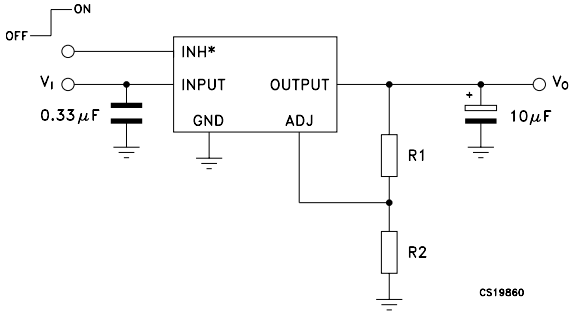
Table 1. Pin description

Symbol	PPAK	DPAK
V_I	2	1
GND	3	2
V_O	4	3
ADJ/N.C. (1)	5	
INHIBIT (2)	1	

1. Not connect for fixed version.
2. Not internally pulled up; in order to assure the operating condition (device in ON mode), it must be connected to a positive voltage higher than 2V.

Figure 4. Application circuit





$V_O = V_{REF} (1 + R_1/R_2)$

* Only for version with inhibit function.

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3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC Input Voltage	30 (1)	V
V_{INH}	Inhibit Input Voltage	14	V
I_O	Output Current	Internally Limited	mA
P_D	Power Dissipation	Internally Limited	mW
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_{OP}	Storage Temperature Range	-40 to 125	°C

1. Above 14V the device is automatically in shut-down.

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

Table 3. Thermal data

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

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4 Electrical characteristics

Table 4. Electrical characteristics of LD29080#15
(I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 3.5V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA	2.5		13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 3 to 7V T_J = -40 to 125°C	1.485	1.5	1.515	V
			1.463		1.537	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 3 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 3.8 ± 1V, I_O = 400mA (*Note 1*)	65	75		dB
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		60		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 5. Electrical characteristics of LD29080#18
(I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 3.5V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA	2.5		13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 3 to 7.3V T_J = -40 to 125°C	1.782	1.8	1.818	V
			1.755		1.845	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 3 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 3.8 ± 1V, I_O = 400mA (*Note 1*)	62	72		dB
V_{DROP}	Dropout Voltage	I_O = 150mA, T_J = -40 to 125°C (*Note 2*)		0.1		V
		I_O = 400mA, T_J = -40 to 125°C (*Note 2*)		0.2		
		I_O = 800mA, T_J = -40 to 125°C (*Note 2*)		0.4	0.7	
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		72		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 6. Electrical characteristics of LD29080#25
I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 4.5V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA			13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 3.5 to 8V T_J = -40 to 125°C	2.475	2.5	2.525	V
			2.438		2.562	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 3.5 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 4.5 ± 1V, I_O = 400mA (*Note 1*)	55	70		dB
V_{DROP}	Dropout Voltage	I_O = 150mA, T_J = -40 to 125°C (*Note 2*)		0.1		V
		I_O = 400mA, T_J = -40 to 125°C (*Note 2*)		0.2		
		I_O = 800mA, T_J = -40 to 125°C (*Note 2*)		0.4	0.7	
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		100		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 7. Electrical characteristics of LD29080#33
(I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 5.3V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA			13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 4.3 to 8.8V T_J = -40 to 125°C	3.267	3.3	3.333	V
			3.218		3.382	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 4.3 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 5.3 ± 1V, I_O = 400mA (*Note 1*)	52	67		dB
V_{DROP}	Dropout Voltage	I_O = 150mA, T_J = -40 to 125°C (*Note 2*)		0.1		V
		I_O = 400mA, T_J = -40 to 125°C (*Note 2*)		0.2		
		I_O = 800mA, T_J = -40 to 125°C (*Note 2*)		0.4	0.7	
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		132		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 8. Electrical characteristics of LD29080#50
(I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 7V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA			13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 6 to 10.5V T_J = -40 to 125°C	4.95	5	5.05	V
			4.875		5.125	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 6 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 7 ± 1V, I_O = 400mA (*Note 1*)	49	64		dB
V_{DROP}	Dropout Voltage	I_O = 150mA, T_J = -40 to 125°C (*Note 2*)		0.1		V
		I_O = 400mA, T_J = -40 to 125°C (*Note 2*)		0.2		
		I_O = 800mA, T_J = -40 to 125°C (*Note 2*)		0.4	0.7	
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		320		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 9. Electrical characteristics of LD29080#80
(I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 10V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA			13	V
V_O	Output Voltage	I_O = 10mA to 800mA, V_I = 9 to 13V T_J = -40 to 125°C	7.92	8	8.08	V
			7.80		8.20	
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 9 to 13V		0.06	0.5	%
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 9 ± 1V, I_O = 400mA (*Note 1*)	45	59		dB
V_{DROP}	Dropout Voltage	I_O = 150mA, T_J = -40 to 125°C (*Note 2*)		0.1		V
		I_O = 400mA, T_J = -40 to 125°C (*Note 2*)		0.2		
		I_O = 800mA, T_J = -40 to 125°C (*Note 2*)		0.4	0.7	
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		320		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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Table 10. Electrical characteristics of LD29080#ADJ
I_O = 10mA, (*Note 4*) T_J = 25°C, V_I = 10V, V_{INH} = 2V, C_I = 330nF, C_O = 10µF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Operating Input Voltage	I_O = 10mA to 800mA	2.5		13	V
ΔV_O	Load Regulation	I_O = 10mA to 800mA		0.2	1.0	%
ΔV_O	Line Regulation	V_I = 2.5 to 13V, I_O = 10mA		0.06	0.5	%
V_{REF}	Reference voltage	I_O = 10mA to 800mA, V_I = 2.5 to 6.73V T_J = -40 to 125°C (*Note 3*)	1.2177	1.23	1.2423	V
			1.1993		1.2607	
SVR	Supply Voltage Rejection	f = 120 Hz, V_I = 3.23 ± 1V, I_O = 400mA (*Note 1*)	45	75		dB
I_q	Quiescent Current	I_O = 10mA, T_J = -40 to 125°C		2	5	mA
		I_O = 400mA, T_J = -40 to 125°C		8	20	
		I_O = 800mA, T_J = -40 to 125°C		14	35	
		V_I = 13V, V_{INH} = GND, T_J = -40 to 125°C		130	180	µA
I_{ADJ}	Adjust Pin Current	T_J = -40 to 125°C			1	µA
I_{sc}	Short Circuit Current	R_L = 0		1.2		A
V_{IL}	Control Input Logic Low	OFF MODE, T_J = -40 to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, T_J = -40 to 125°C	2			V
I_{INH}	Control Input Current	V_{INH} = 13V, T_J = -40 to 125°C		5	10	µA
eN	Output Noise Voltage	B_P = 10Hz to 100KHz, I_O = 100mA		50		μV_{RMS}

Note: 1 Guaranteed by design.

2 Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value with V_O+1V applied to V_I.

3 Reference Voltage is measured between output and GND pins, with ADJ PIN tied to V_O.

4 In order to avoid any output voltage rise within the whole operating temperature range, due to output leakage current, a minimum load current of 2mA is required.

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5 Typical characteristics

Figure 5. Output voltage vs temperature

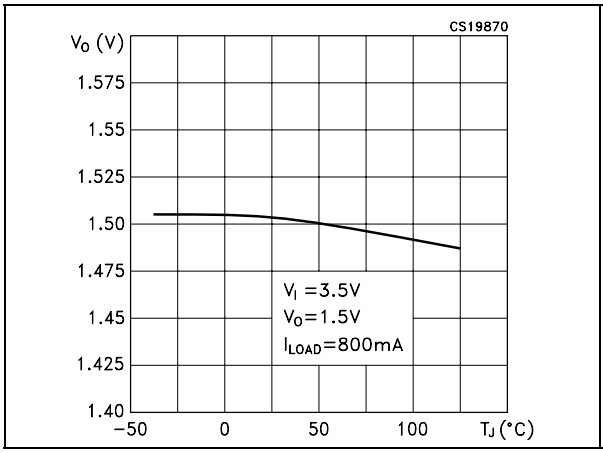

Figure 6. Reference voltage vs temperature

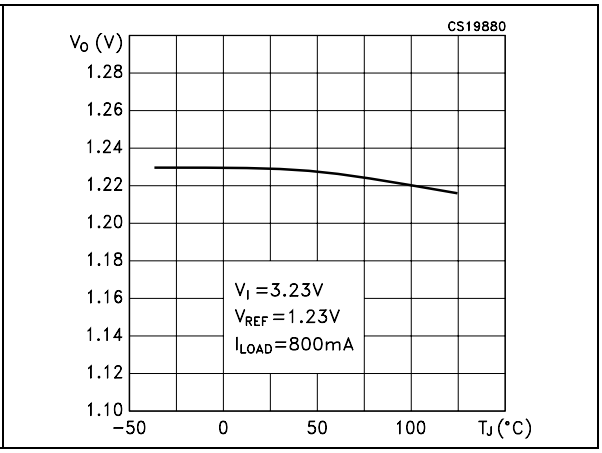

Figure 7. Dropout voltage vs temperature

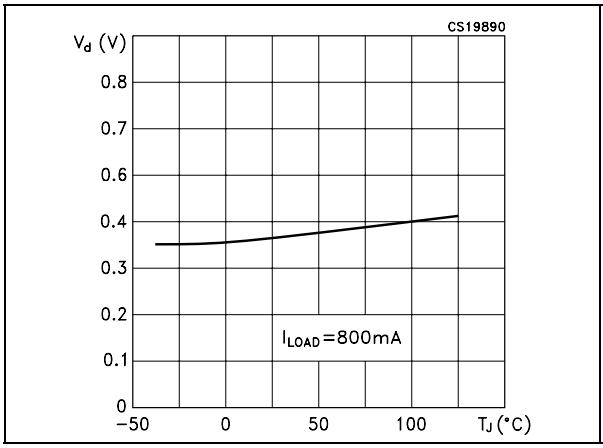

Figure 8. Dropout voltage vs output current

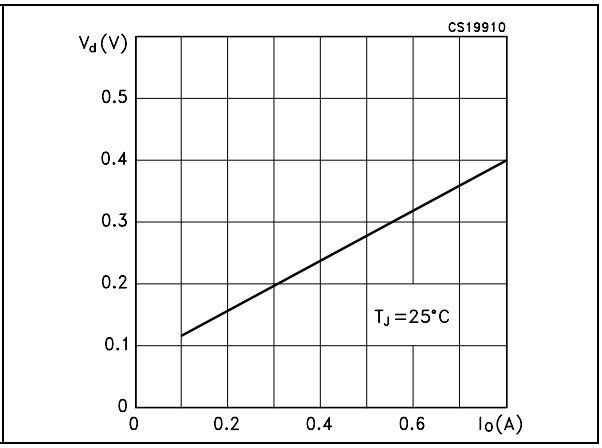

Figure 9. Quiescent current vs output current

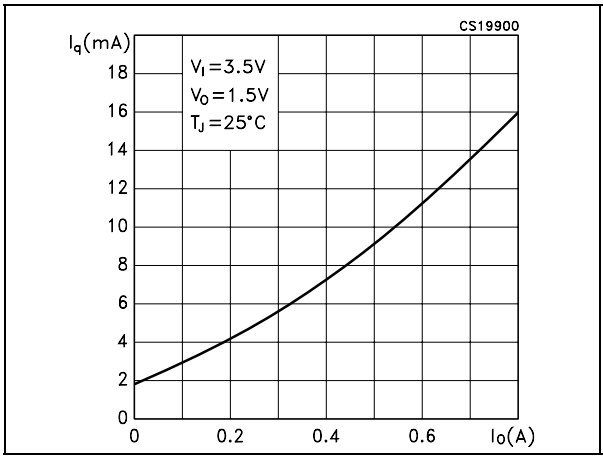

Figure 10. Quiescent current vs temperature

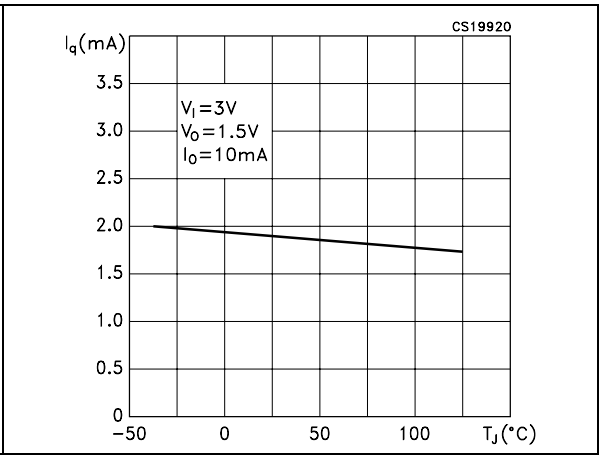

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Figure 11. Quiescent current vs supply voltage

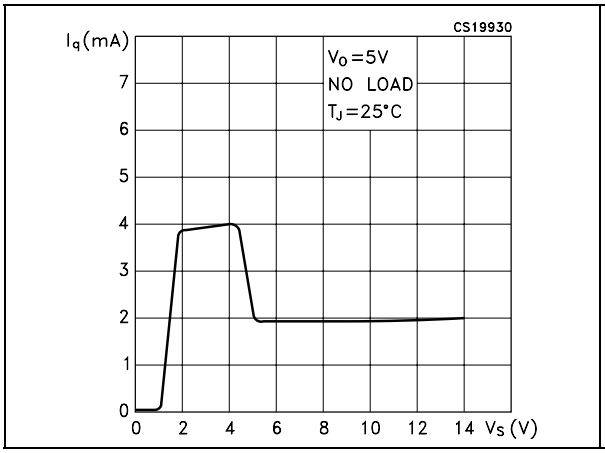

Figure 12. Quiescent current vs temperature

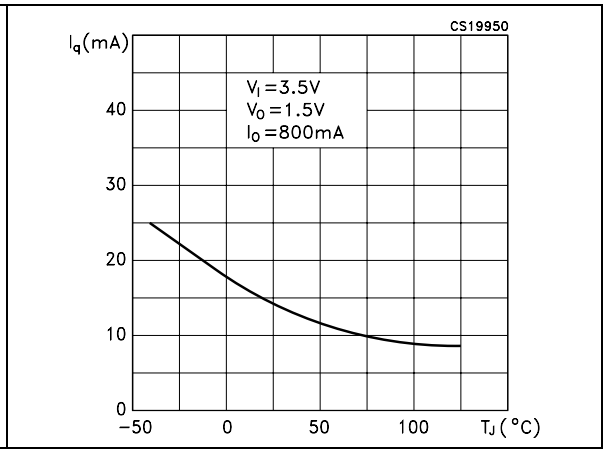

Figure 13. Short circuit current vs temperature

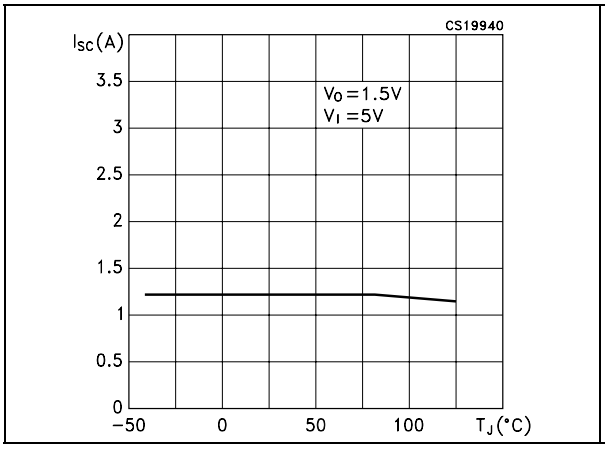

Figure 14. Adjust pin current vs temperature

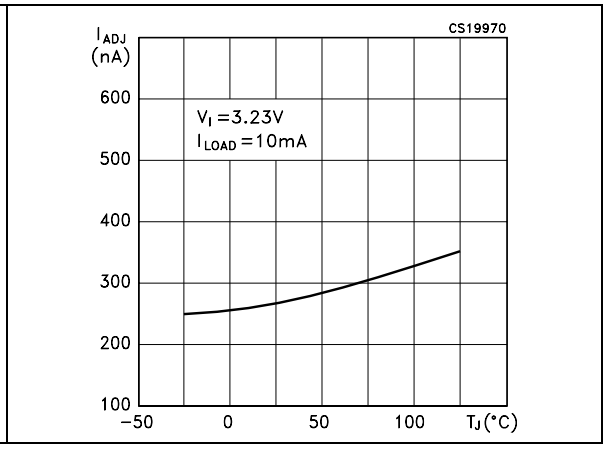

Figure 15. Supply voltage rejection vs temperature

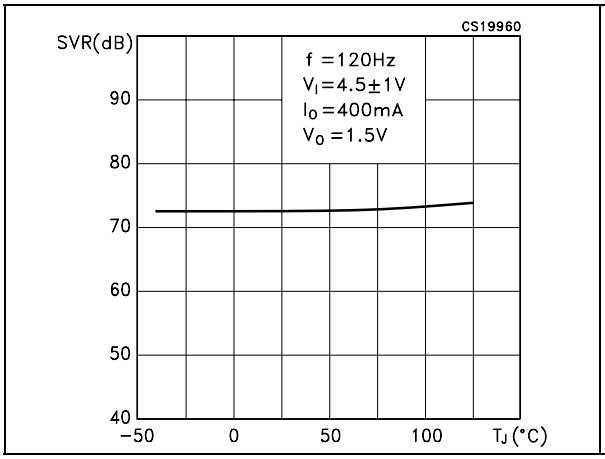

Figure 16. Output voltage vs input voltage

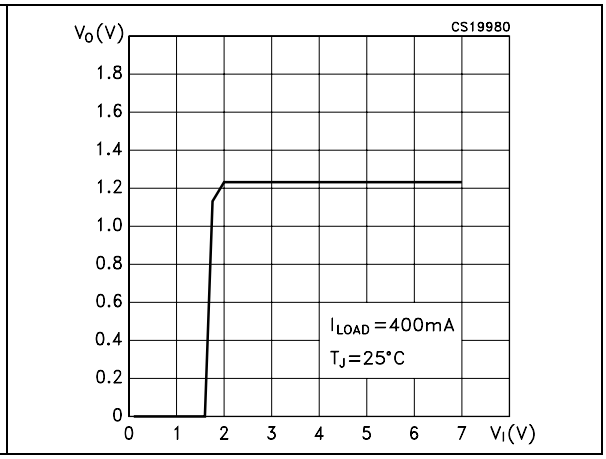

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Figure 17. Stability vs C_O

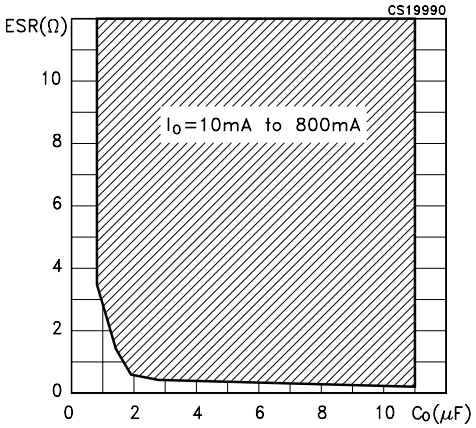
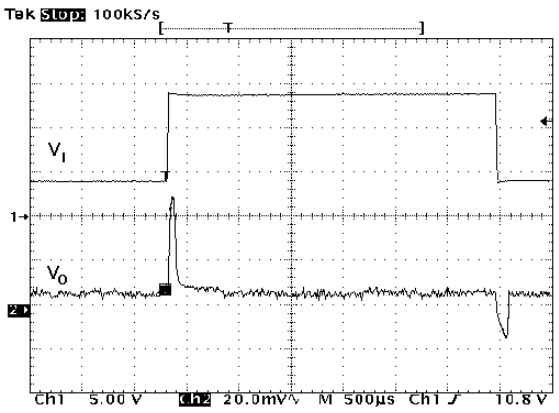
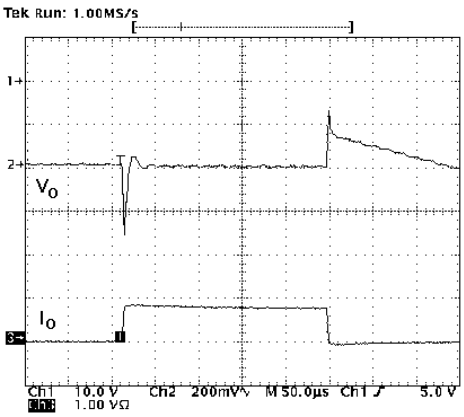


Figure 18. Line transient



V_I=3.5 to 13V, I_O=10mA, V_O=1.5V

Figure 19. Load transient



V_I=3.5V, I_O=10mA to 0.8A, V_O=1.5V

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6 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.

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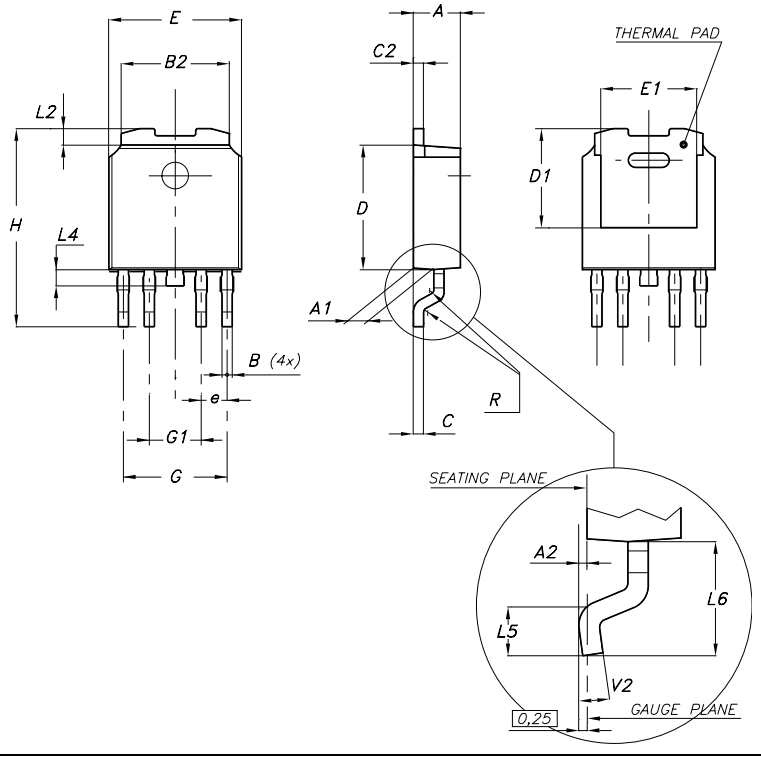
PPAK MECHANICAL DATA

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	0.4		0.6	0.015		0.023
B2	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			0.201	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		1.27			0.050	
G	4.9		5.25	0.193		0.206
G1	2.38		2.7	0.093		0.106
H	9.35		10.1	0.368		0.397
L2		0.8	1		0.031	0.039
L4	0.6		1	0.023		0.039
L5	1			0.039		
L6		2.8			0.110	



0078180-E

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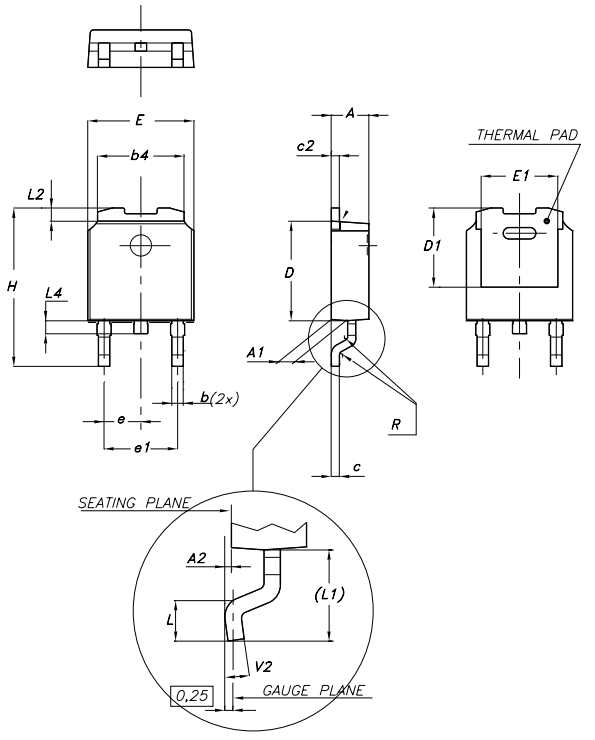
DPAK MECHANICAL DATA

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

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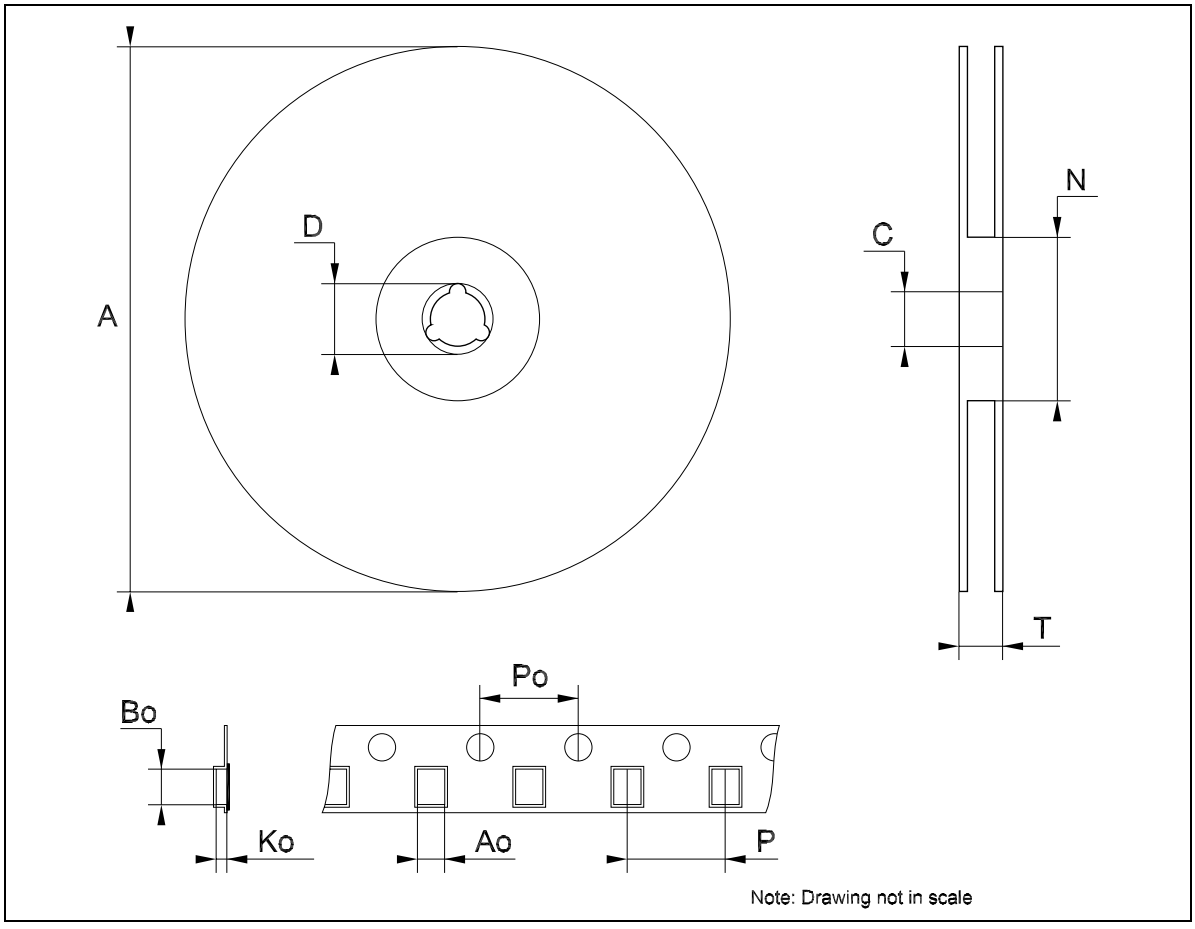
Tape & Reel DPAK-PPAK MECHANICAL DATA

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

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7 Revision history

Table 11. Revision history

Date	Revision	Changes
15-Oct-2004	1	First Release.
20-Oct-2005	2	Order codes has been updated.
14-May-2007	3	Order codes has been updated.

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