

1.5A, VERY LOW DROP VOLTAGE REGULATORS

- VERY LOW DROPOUT VOLTAGE (TYP. 0.4 AT 1.5A)
- GUARANTEED OUTPUT CURRENT UP TO 1.5A
- FIXED AND ADJUSTABLE OUTPUT VOLTAGE ($\pm 1\%$ AT 25°C)
- INTERNAL CURRENT AND THERMAL LIMIT
- LOGIC CONTROLLED ELECTRONIC SHUTDOWN AVAILABLE IN PPAK

DESCRIPTION

The LD29150 is a high current, high accuracy, low-dropout voltage regulator series. These regulators feature 400mV dropout voltage and very low ground current. Designed for high current loads, these devices are also used in lower current, extremely low dropout-critical systems, where their tiny dropout voltage and ground current values are important attributes. Typical applications 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.

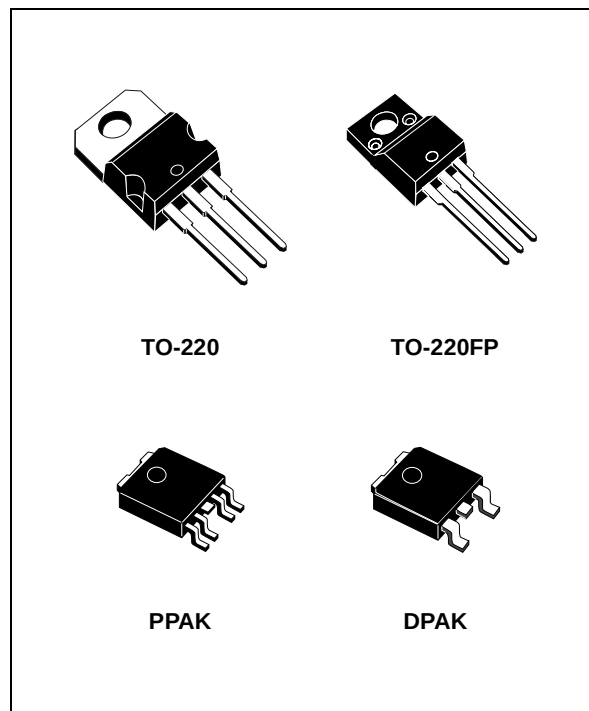


Figure 1: Schematic Diagram For Adjustable Version

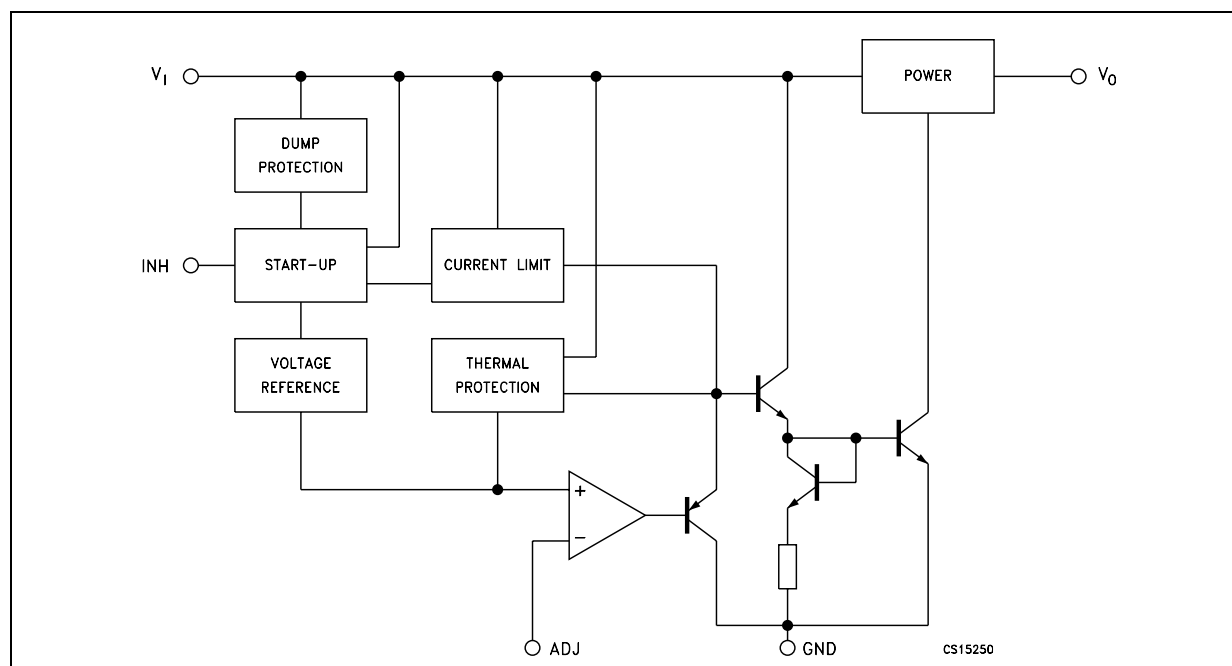
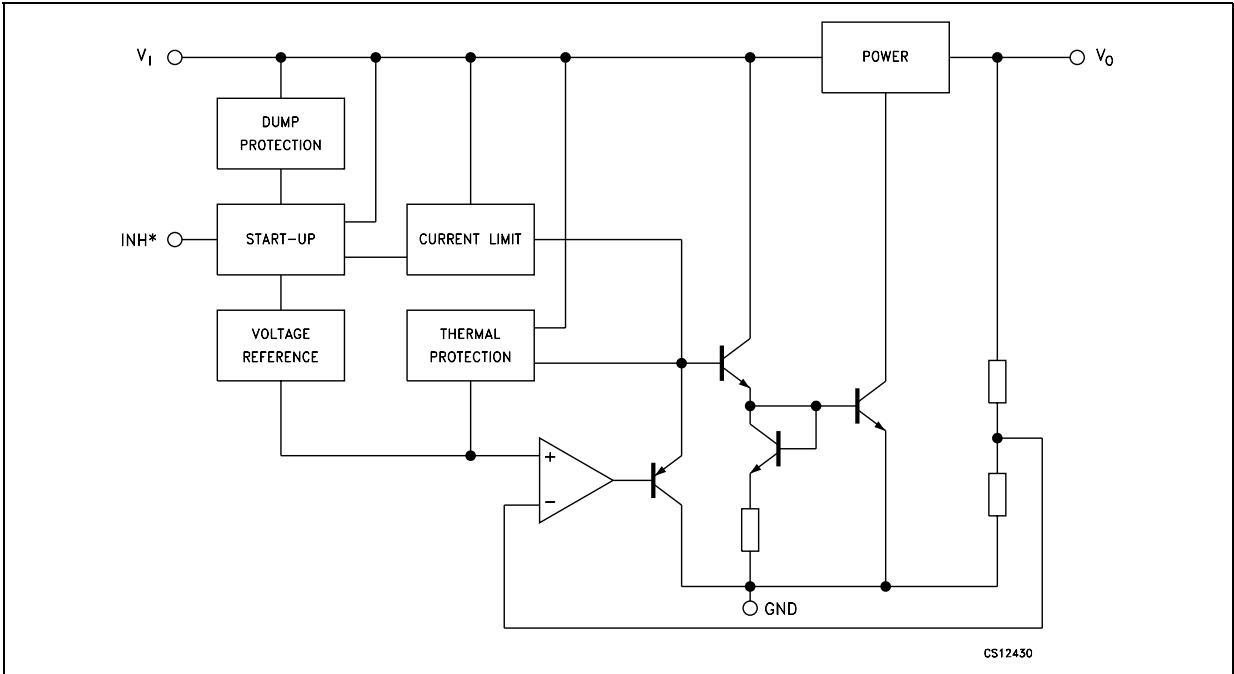


Figure 2: Schematic Diagram For Fixed Version



* Only for version with inhibit function.

Table 1: Ordering Codes

TO-220 (#)	TO-220FP (#)	DPAK (*)	PPAK (*)	OUTPUT VOLTAGE
LD29150V15	LD29150P15	LD29150DT15	LD29150PT15	1.5 V
LD29150V18	LD29150P18	LD29150DT18	LD29150PT18	1.8 V
LD29150V25	LD29150P25	LD29150DT25	LD29150PT25	2.5 V
LD29150V33	LD29150P33	LD29150DT33	LD29150PT33	3.3 V
LD29150V50	LD29150P50	LD29150DT50	LD29150PT50	5.0 V
LD29150V80	LD29150P80	LD29150DT80	LD29150PT80	8.0 V
			LD29150PT	ADJ

(*) Available in Tape & Reel with the suffix "R".

(#) Available on request.

Table 2: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V _I	DC Input Voltage	30 (*)	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}	Operating Junction Temperature Range	-40 to 125	°C

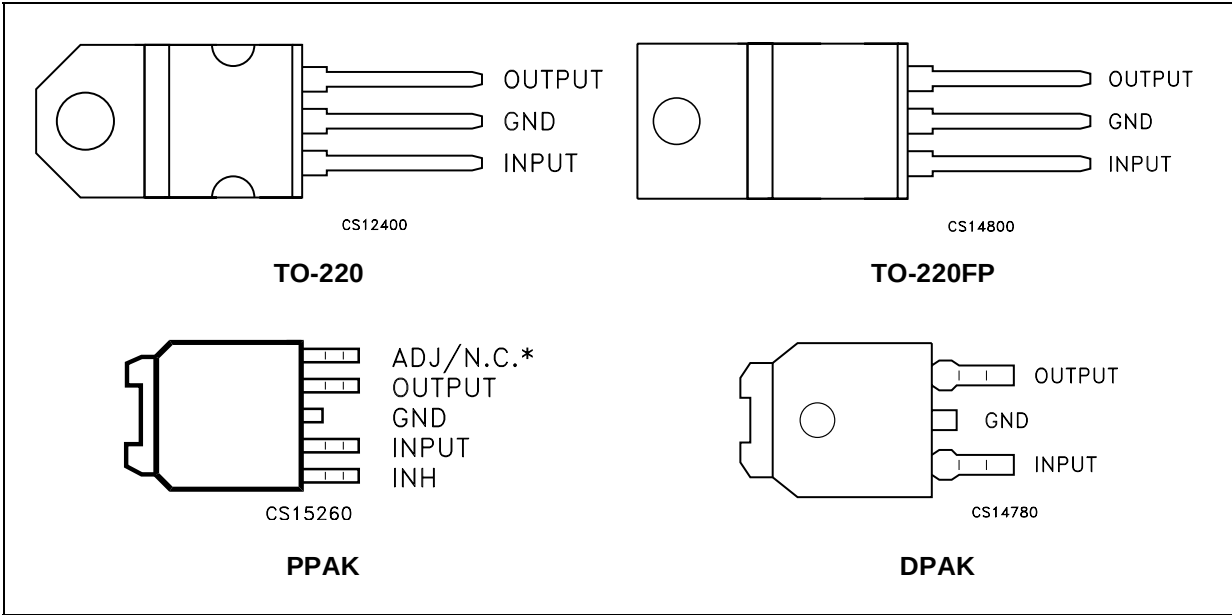
(*) Above 14V the device is automatically in shut-down.

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

Table 3: Thermal Data

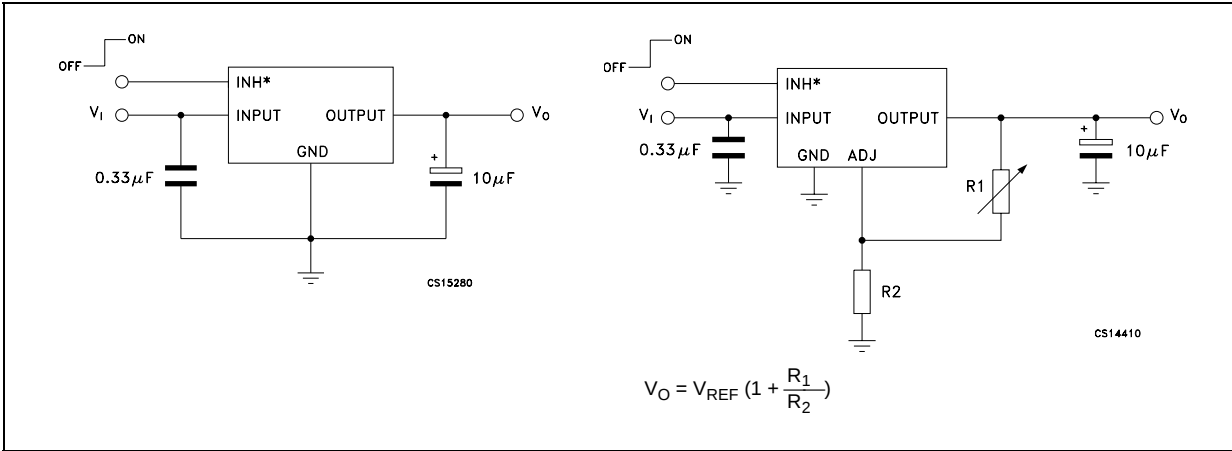
Symbol	Parameter	DPAK	PPAK	TO-220	TO-220FP	Unit
R _{thj-case}	Thermal Resistance Junction-case	8	8	3	4	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	100	100	50	60	°C/W

Figure 3: Pin Connection (top view)



* Not connected for fixed version.

Figure 4: Application Circuit



* Only for version with inhibit function.

Table 4: Electrical Characteristics Of LD29150#15(I_O = 10mA, T_J = 25°C, V_I = 3.5V, V_{INH} = 2V (Note 2), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _I	Minimum Operating Input Voltage	I _O = 10mA to 1.5A T _J = -40 to 125°C	2.5			V
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 3 to 7V T _J = -40 to 125°C	1.485 1.47	1.5	1.515 1.53	V
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 3.5 ± 1V, I _O = 0.75A (Note 1)	65	75		dB
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{sc}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 2) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 2) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		60		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 2: Only for version with Inhibit function.

Table 5: Electrical Characteristics Of LD29150#18(I_O = 10mA, T_J = 25°C, V_I = 3.8V, V_{INH} = 2V (Note 3), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 3 to 7.3V T _J = -40 to 125°C	1.782	1.8	1.818	V
			1.764		1.836	
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 0.75A (Note 1)	62	72		dB
V _{DROP}	Dropout Voltage	I _O = 250mA, T _J = -40 to 125°C (Note 2)		0.1		V
		I _O = 0.75A, T _J = -40 to 125°C (Note 2)		0.2		
		I _O = 1.5A, T _J = -40 to 125°C (Note 2)		0.4	0.7	
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{sc}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 3) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		72		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 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.

NOTE 3: Only for version with Inhibit function.

Table 6: Electrical Characteristics Of LD29150#25(I_O = 10mA, T_J = 25°C, V_I = 4.5V, V_{INH} = 2V (Note 3), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 3.5 to 8V T _J = -40 to 125°C	2.475 2.45	2.5	2.525 2.55	V
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 0.75A (Note 1)	55	70		dB
V _{DROP}	Dropout Voltage	I _O = 250mA, T _J = -40 to 125°C (Note 2)		0.1		V
		I _O = 0.75A, T _J = -40 to 125°C (Note 2)		0.2		
		I _O = 1.5A, T _J = -40 to 125°C (Note 2)		0.4	0.7	
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{sc}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 3) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		100		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 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.

NOTE 3: Only for version with Inhibit function.

Table 7: Electrical Characteristics Of LD29150#33(I_O = 10mA, T_J = 25°C, V_I = 5.3V, V_{INH} = 2V (Note 3), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 4.3 to 8.8V T _J = -40 to 125°C	3.267 3.234	3.3	3.333 3.366	V
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 0.75A (Note 1)	52	67		dB
V _{DROP}	Dropout Voltage	I _O = 250mA, T _J = -40 to 125°C (Note 2)		0.1		V
		I _O = 0.75A, T _J = -40 to 125°C (Note 2)		0.2		
		I _O = 1.5A, T _J = -40 to 125°C (Note 2)		0.4	0.7	
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{sc}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 3) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		132		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 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.

NOTE 3: Only for version with Inhibit function.

Table 8: Electrical Characteristics Of LD29150#50(I_O = 10mA, T_J = 25°C, V_I = 7V, V_{INH} = 2V (Note 3), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 6 to 10.5V T _J = -40 to 125°C	4.95 4.9	5	5.05 5.1	V
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 0.75A (Note 1)	49	64		dB
V _{DROP}	Dropout Voltage	I _O = 250mA, T _J = -40 to 125°C (Note 2)		0.1		V
		I _O = 0.75A, T _J = -40 to 125°C (Note 2)		0.2		
		I _O = 1.5A, T _J = -40 to 125°C (Note 2)		0.4	0.7	
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{SC}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 3) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		200		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 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.

NOTE 3: Only for version with Inhibit function.

Table 9: Electrical Characteristics Of LD29150#80(I_O = 10mA, T_J = 25°C, V_I = 10V, V_{INH} = 2V (Note 3), C_I = 330nF, C_O = 10μF, unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _O	Output Voltage	I _O = 10mA to 1.5A, V _I = 9 to 13V T _J = -40 to 125°C	7.92 7.84	8	8.08 8.16	V
ΔV _O	Load Regulation	I _O = 10mA to 1.5A		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 = 0.75A (Note 1)	45	59		dB
V _{DROP}	Dropout Voltage	I _O = 250mA, T _J = -40 to 125°C (Note 2)		0.1		V
		I _O = 0.75A, T _J = -40 to 125°C (Note 2)		0.2		
		I _O = 1.5A, T _J = -40 to 125°C (Note 2)		0.4	0.7	
I _q	Quiescent Current	I _O = 0.75A, T _J = -40 to 125°C		15	40	mA
		I _O = 1.5A, T _J = -40 to 125°C		30	80	
		V _I = 13V, V _{INH} = GND T _J = -40 to 125°C		130	180	μA
I _{SC}	Short Circuit Current	V _I - V _O = 5.5V		2.2		A
V _{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) T _J = -40 to 125°C			0.8	V
V _{IH}	Control Input Logic High	ON MODE, (NOTE 3) T _J = -40 to 125°C	2			V
I _{INH}	Control Input Current	T _J = -40 to 125°C V _{INH} = 13V		5	10	μA
eN	Output Noise Voltage	B _P = 10Hz to 100KHz I _O = 100mA		320		μV _{RMS}

NOTE 1: Guaranteed by design.

NOTE 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.

NOTE 3: Only for version with Inhibit function.

Table 10: Electrical Characteristics Of LD29150#ADJ

($I_O = 10\text{mA}$, $T_J = 25^\circ\text{C}$, $V_I = 3.23\text{V}$, $V_{INH} = 2\text{V}$ (Note 3), $C_I = 330\text{nF}$, $C_O = 10\mu\text{F}$ adjust pin tied to output pin)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_I	Minimum Operating Input Voltage	$I_O = 10\text{mA}$ to 1.5A $T_J = -40$ to 125°C	2.5			V
ΔV_O	Load Regulation	$I_O = 10\text{mA}$ to 1.5A		0.2	1.0	%
ΔV_O	Line Regulation	$V_I = 2.5\text{V}$ to 13V $I_O = 10\text{mA}$		0.06	0.5	%
V_{REF}	Reference Voltage	$I_O = 10\text{mA}$ to 1.5A , $V_I = 2.5$ to 4.5V $T_J = -40$ to 125°C (Note 2)	-1%	1.23	+1%	V
			-2%		+2%	
SVR	Supply Voltage Rejection	$f = 120\text{Hz}$, $V_I = 3.23 \pm 1\text{V}$, $I_O = 0.75\text{A}$ (Note 1)	45	75		dB
I_q	Quiescent Current	$I_O = 0.75\text{A}$, $T_J = -40$ to 125°C		15	40	mA
		$I_O = 1.5\text{A}$, $T_J = -40$ to 125°C		30	80	
		$V_I = 13\text{V}$, $V_{INH} = \text{GND}$ $T_J = -40$ to 125°C		130	180	μA
I_{ADJ}	Adjust Pin Current	$T_J = -40$ to 125°C (Note 1)			1	μA
I_{sc}	Short Circuit Current	$V_I - V_O = 5.5\text{V}$		2.2		A
V_{IL}	Control Input Logic Low	OFF MODE, (NOTE 3) $T_J = -40$ to 125°C			0.8	V
V_{IH}	Control Input Logic High	ON MODE, (NOTE 3) $T_J = -40$ to 125°C	2			V
I_{INH}	Control Input Current	$T_J = -40$ to 125°C $V_{INH} = 13\text{V}$		5	10	μA
eN	Output Noise Voltage	$B_P = 10\text{Hz}$ to 100KHz $I_O = 100\text{mA}$		50		μV_{RMS}

NOTE 1: Guaranteed by design.

NOTE 2: reference Voltage is measured between output and GND pin, with ADJ PIN tied to V_{OUT} .

NOTE 3: Only for version with Inhibit function.

TYPICAL CHARACTERISTICS

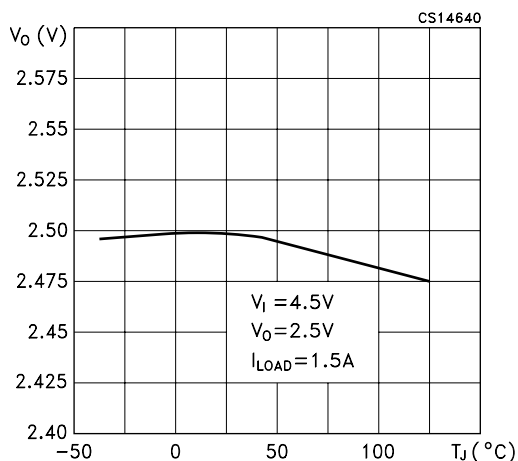
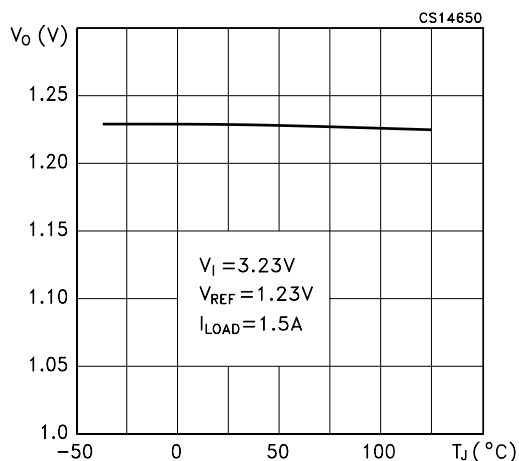
Figure 5: Output Voltage vs Temperature**Figure 6: Reference Voltage vs Temperature**

Figure 7: Dropout Voltage vs Temperature

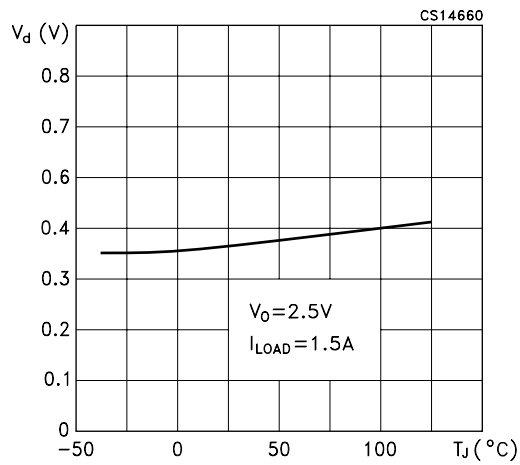


Figure 8: Dropout Voltage vs Output Current

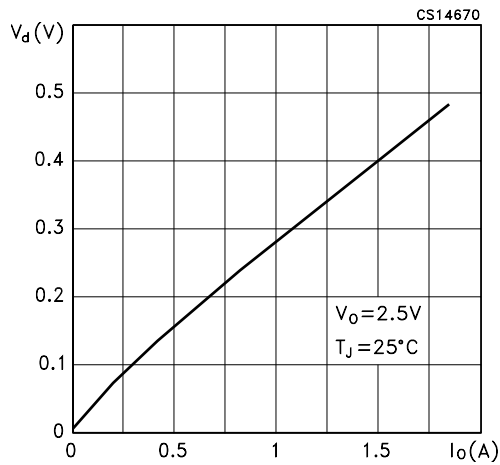


Figure 9: Quiescent Current vs Output Current

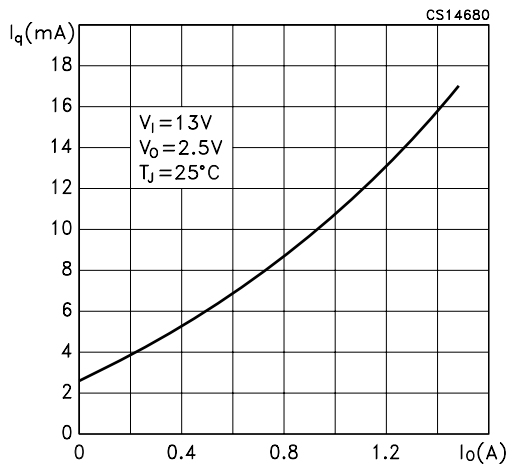


Figure 10: Quiescent Current vs Output Current

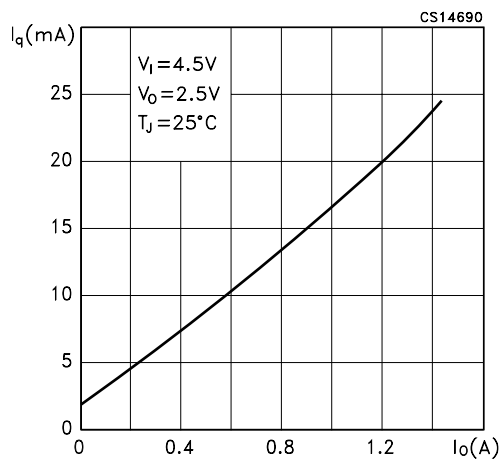


Figure 11: Quiescent Current vs Supply Voltage

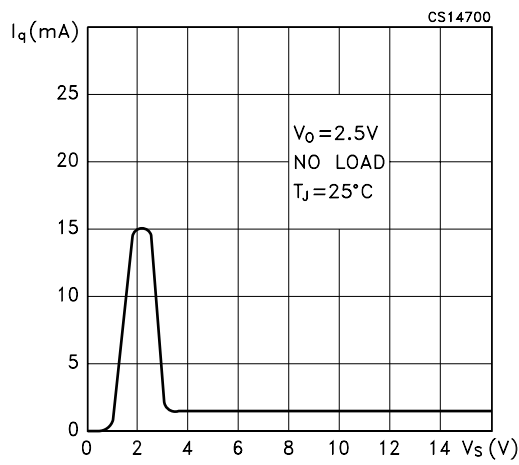


Figure 12: Quiescent Current vs Temperature

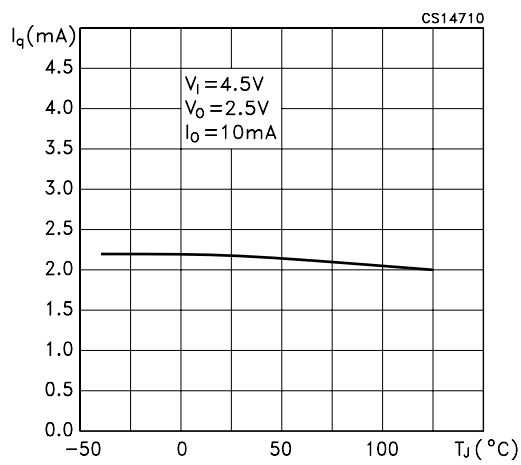


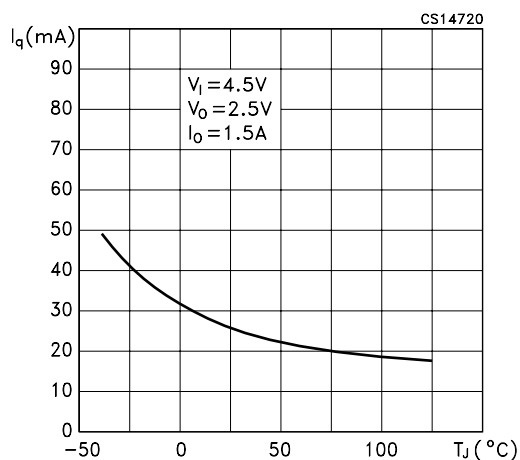
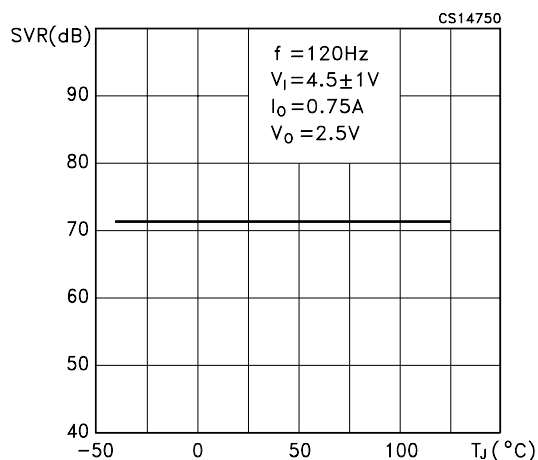
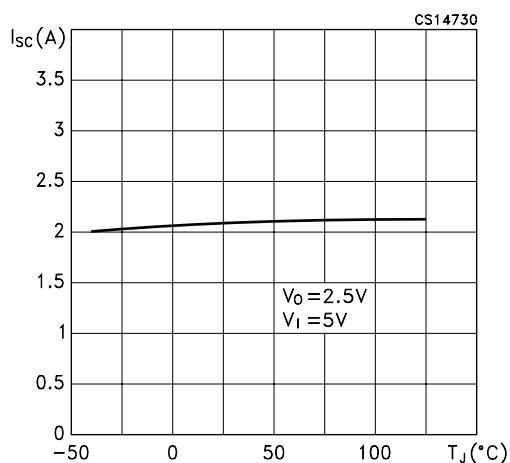
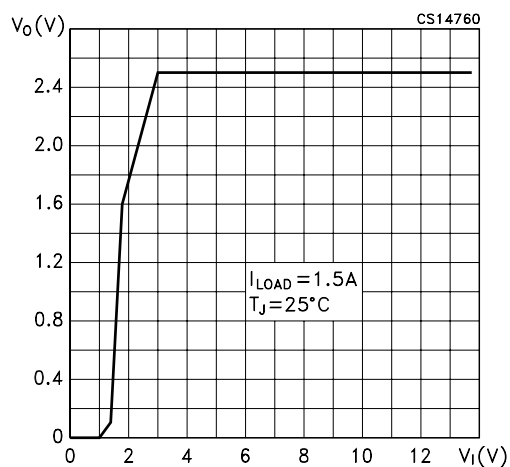
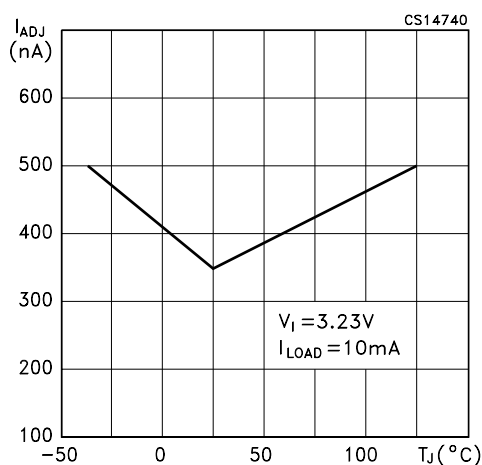
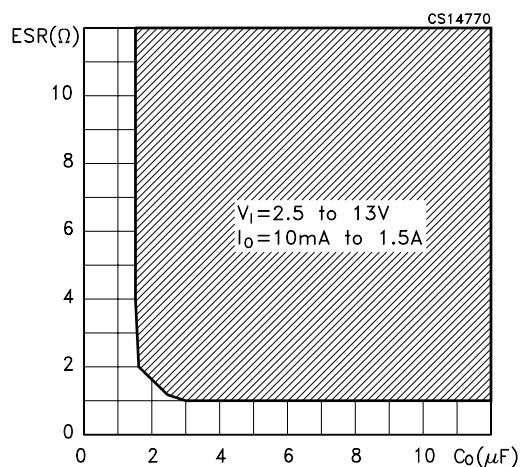
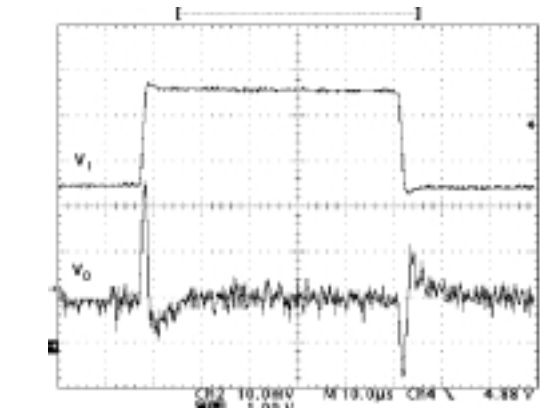
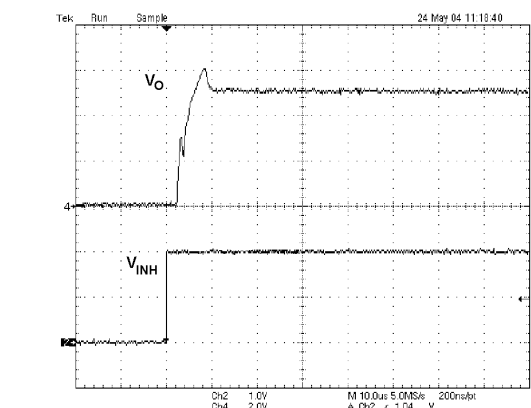
Figure 13: Quiescent Current vs Temperature**Figure 16: Supply Voltage Rejection vs Temperature****Figure 14: Short Circuit Current vs Temperature****Figure 17: Output Voltage vs Input Voltage****Figure 15: Adjust Pin Current vs Temperature****Figure 18: Stability vs C_O** 

Figure 19: Line Transient



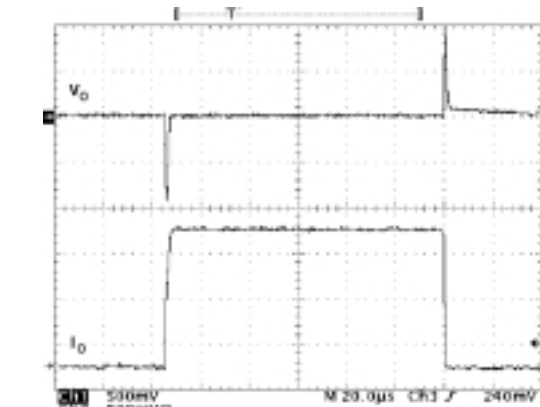
$V_I=3.5$ to $5.5V$, $I_O=10mA$, $V_O=2.5V$, $C_O=10\mu F$

Figure 21: Start-Up Time 10mA



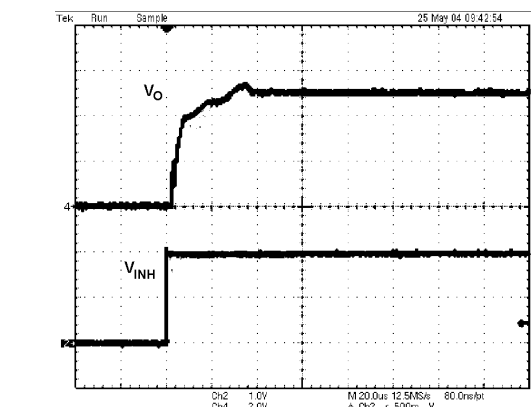
$C_O=10\mu F$, $I_O=10mA$, $V_{INH}=2V$, $V_O=5V$, $V_I=7V$

Figure 20: Load Transient



$V_I=5V$, $I_O=10mA$ to $1.5A$, $V_O=2.5V$, $C_O=10\mu F$

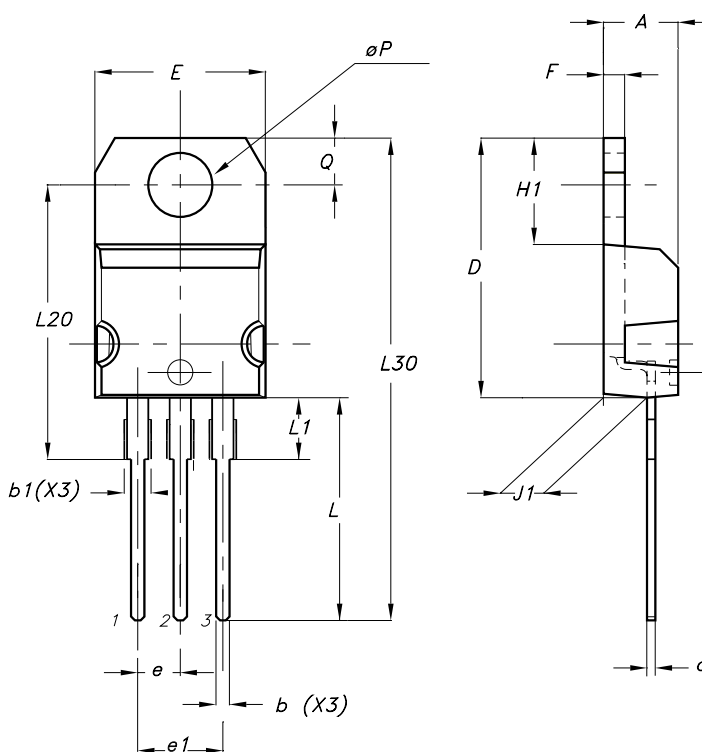
Figure 22: Start-Up Time 1.5A



$C_O=10\mu F$, $I_O=1.5A$, $V_{INH}=2V$, $V_O=5V$, $V_I=7V$

TO-220 (A TYPE) MECHANICAL DATA

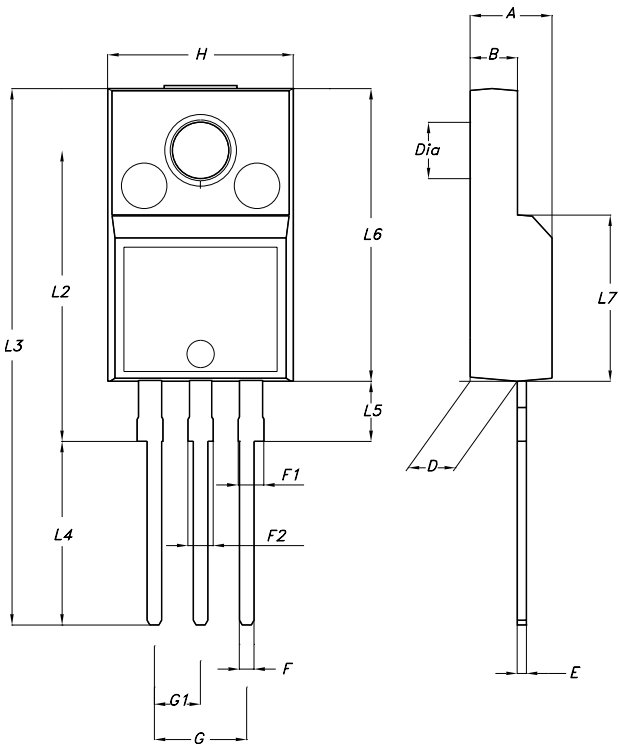
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.067
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.600		0.620
E	10.0		10.40	0.393		0.409
e	2.4		2.7	0.094		0.106
e1	4.95		5.15	0.194		0.203
F	1.23		1.32	0.048		0.051
H1	6.2		6.6	0.244		0.260
J1	2.40		2.72	0.094		0.107
L	13.0		14.0	0.511		0.551
L1	3.5		3.93	0.137		0.154
L20		16.4			0.645	
L30		28.9			1.138	
ϕP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



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TO-220FP MECHANICAL DATA

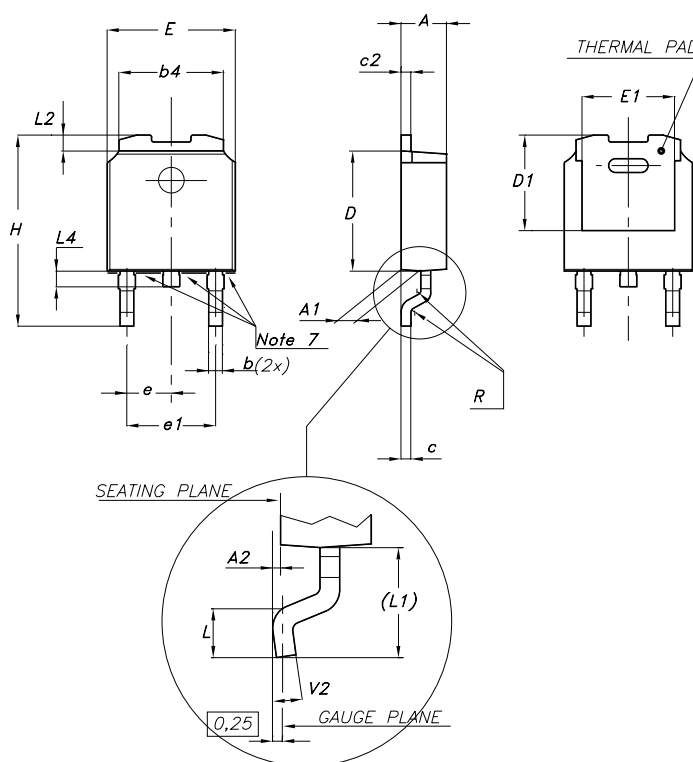
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.70	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.50	0.045		0.059
F2	1.15		1.50	0.045		0.059
G	4.95		5.2	0.194		0.204
G1	2.4		2.7	0.094		0.106
H	10.0		10.40	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L5	2.9		3.6	0.114		0.142
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
DIA.	3		3.2	0.118		0.126



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DPAK MECHANICAL DATA

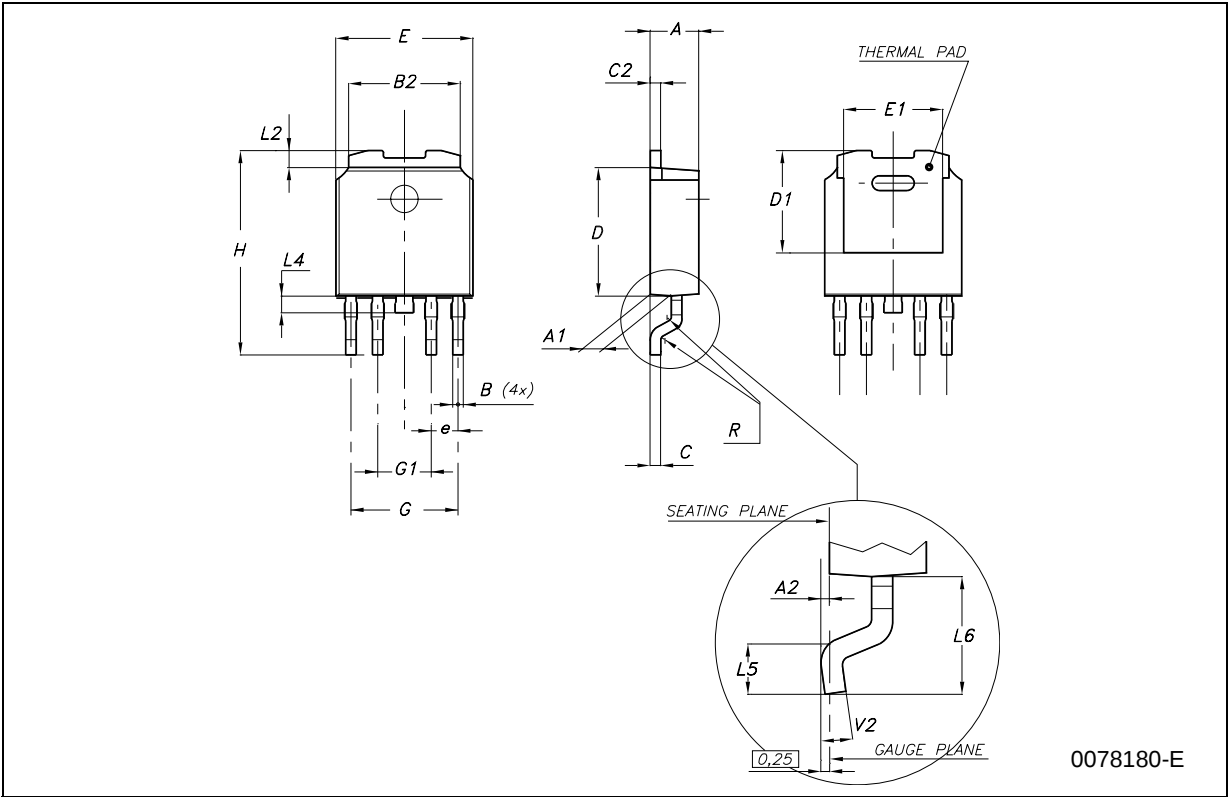
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
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



0068772-F

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	



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	0.276
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

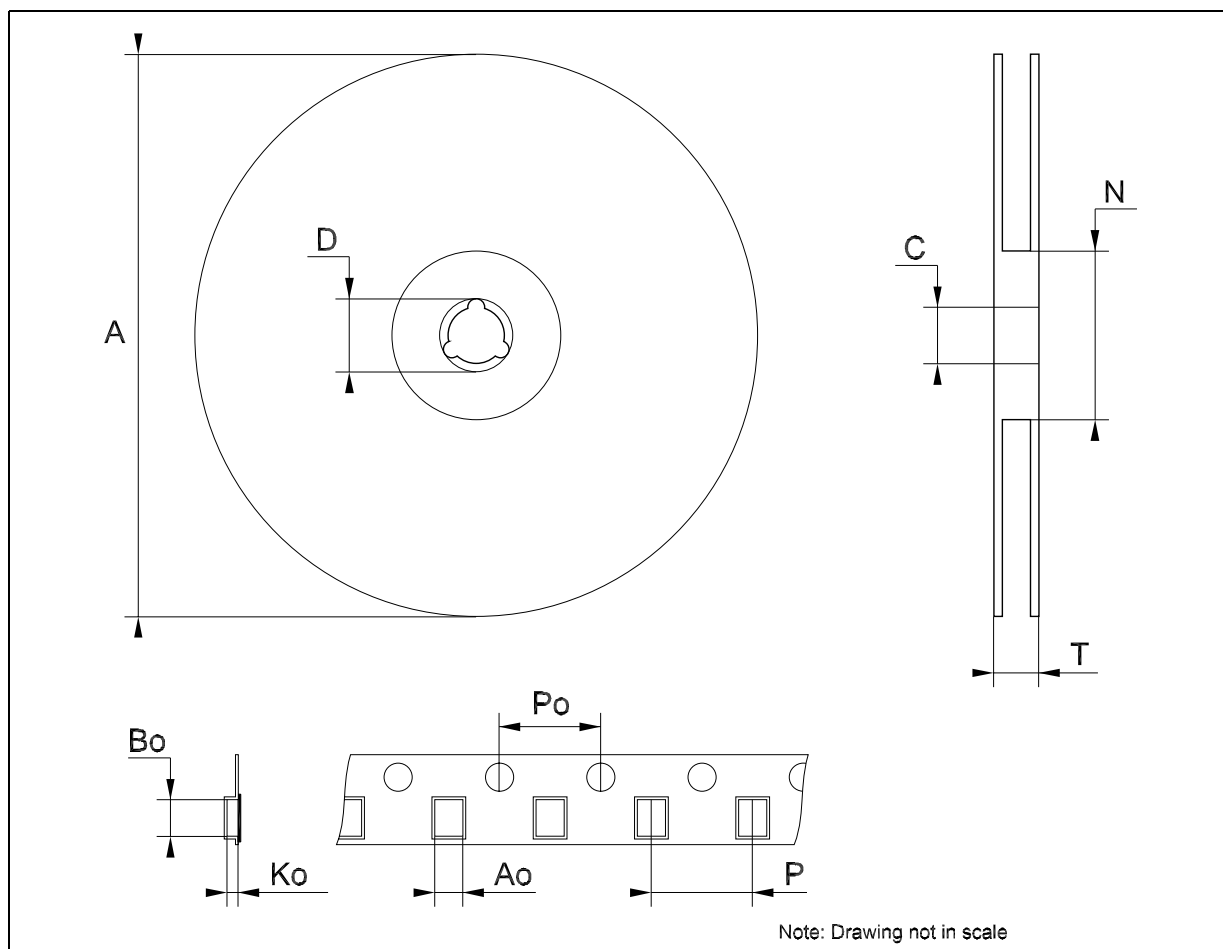


Table 11: Revision History

Date	Revision	Description of Changes
17-Jun-2004	5	Add figures 20 and 21, PPAK, TO-220 and TO-220FP mechanical data updated.
19-Jul-2004	6	Remove Package TO-220FP4.
08-Nov-2004	7	Mistake Figure 7.

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