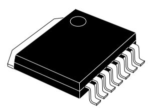
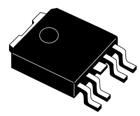
LDRxxyy

VERY LOW DROP DUAL VOLTAGE REGULATOR

- OUTPUT CURRENT 1 UP TO 500mA
- OUTPUT CURRENT 2 UP TO 1.0A
- LOW DROPOUT VOLTAGE 1 (0.3V @ I_O =500mA)
- LOW DROPOUT VOLTAGE 2 (0.4V @ I_O =1A)
- VERY LOW SUPPLY CURRENT (TYP.50µA IN OFF MODE, 1.6mA MAX IN ON MODE)
- LOGIC-CONTROLLED ELECTRONIC SHUTDOWN
- OUTPUT VOLTAGE AVAILABILITY FOR EACH REGULATOR: 1.8V, 2.5V, 3.3V
- INTERNAL CURRENT AND THERMAL LIMIT
- STABLE WITH LOW VALUE (MIN 4.7µF) AND LOW E.S.R. OUTPUT CAPACITORS
- SUPPLY VOLTAGE REJECTION: 70dB (TYP.)
- TEMPERATURE RANGE (-40°C TO 125°C)


SPAK-7L


PPAK

DESCRIPTION

The LDRxxyy is a Very Low Drop Dual Voltage Regulator available in PPAK for the version without inhibit and in SPAK-7L for the version with the shutdown feature. The very low drop-voltage (0.5V) and the very low supply current make it particularly suitable for low noise and low power applications such as PDA, MICRODRIVE and other data storage applications while the used high voltage technology makes this device suitable for consumer applications such as MONITORS AND SET-TOP-BOX. For each V_O a Shutdown Logic Control function is available (TTL compatible) to decrease the total power consumption.

Figure 1: Block Diagram

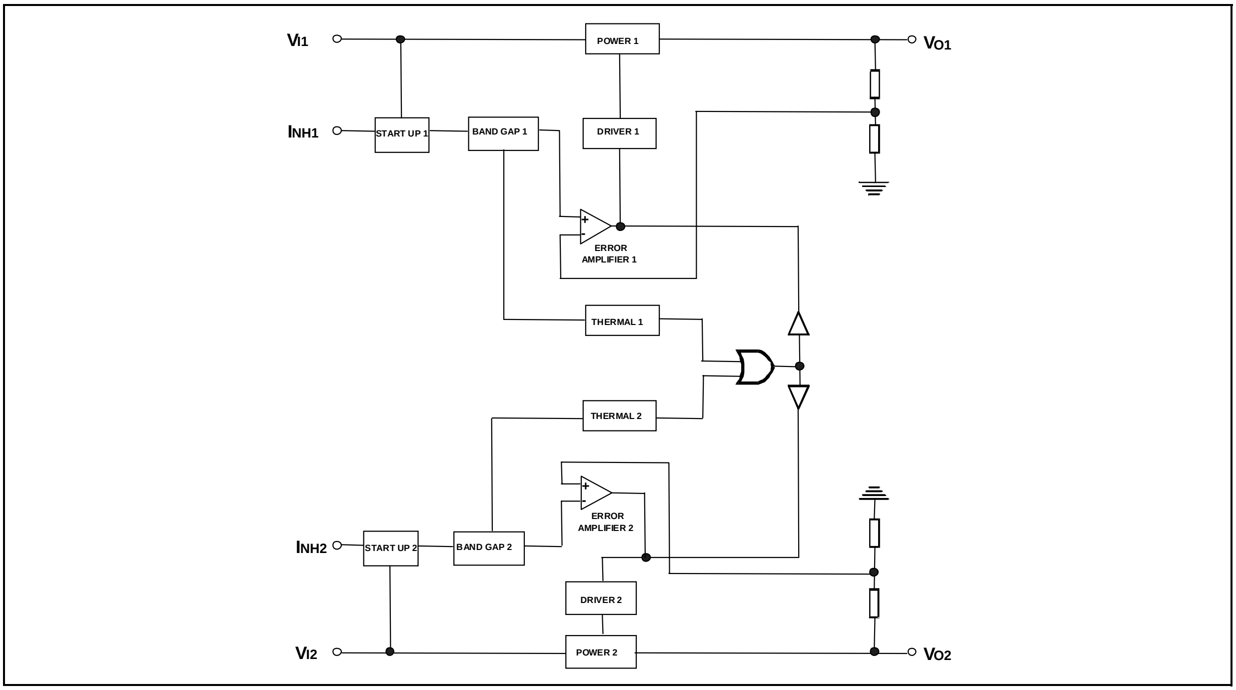


Table 1: Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{I1} & V_{I2}	DC Input Voltage	-0.3 to 15	V
$\overline{INH}$	Shutdown Voltage	-0.3 to 15	V
I_O	Output Current	Internally Limited	
P_{TOT}	Power Dissipation	Internally Limited	
T_{STG}	Storage Temperature Range	-50 to +150	°C
T_A	Operating Ambient Temperature Range	-40 to +125	°C

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

Table 2: Thermal Data

Symbol	Parameter	PPAK	SPAK-7L	Unit
R_{THJ-C}	Junction to case thermal resistance	8	2	°C/W

Figure 2: Connection Diagram (top view)

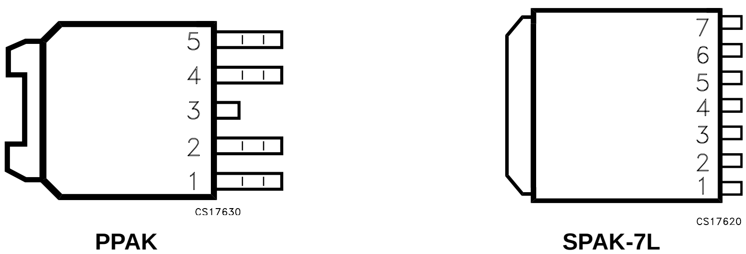


Table 3: Pin Description

Symbol	Pin N° for PPAK	Pin N° for SPAK-7L	Name and Function
GND	3	4	Ground pin
V_{I1}	2	2	Input 1 Supply Pin. Bypass with a 2.2µF capacitor to GND
V_{I2}	1	1	Input 2 Supply Pin. Bypass with a 2.2µF capacitor to GND
V_{INH1}		3	Enable 1 Pin. Internally connected to V_{I1} in the PPAK version
V_{INH2}		5	Enable 2 Pin. Internally connected to V_{I2} in the PPAK version
V_{O1}	4	6	Output 1 Pin. Bypass with a 4.7µF capacitor to GND Port
V_{O2}	5	7	Output 2 Pin. Bypass with a 4.7µF capacitor to GND Port
N.C.			Not Internally Connected

Table 4: Order Codes

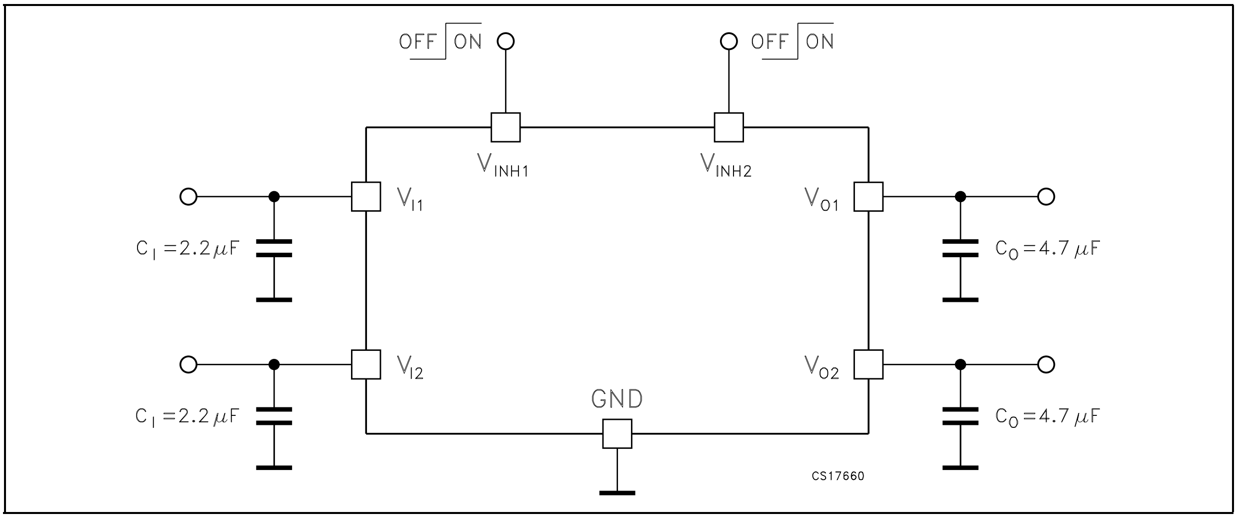
V_{O1}	V_{O2}	TYPE	PART NUMBERS	
			SPAK-7L	PPAK
1.8 V	2.5 V	LDR1825	LDR1825K7-R	LDR1825PT-R
1.8 V	3.3 V	LDR1833	LDR1833K7-R	LDR1833PT-R
2.5 V	1.8 V	LDR2518	LDR2518K7-R	LDR2518PT-R
2.5 V	3.3 V	LDR2533	LDR2533K7-R	LDR2533PT-R
3.3 V	1.8 V	LDR3318	LDR3318K7-R	LDR3318PT-R
3.3 V	2.5 V	LDR3325	LDR3325K7-R	LDR3325PT-R

Table 5: Electrical Characteristics ($V_{I1} = V_{O1}$+2V, $V_{I2} = V_{O2}$+2V, $V_{INH1} = V_{INH2}$ = 2.5V, $C_{I1,2}$ = 2.2µF, $C_{O1,2}$ = 4.7µF, $I_{O1} = I_{O2}$ = 10mA, T_A = -40°C to 125°C, unless otherwise specified. Typical values are referred at T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{O1}	Output Voltage 1		-5	V_{NOM1}	+5	%V
V_{O2}	Output Voltage 2		-5	V_{NOM2}	+5	%V
V_{DROP1}	Dropout Voltage 1 (1)	I_{O1} = 500mA		0.3	0.7	V
V_{DROP2}	Dropout Voltage 2 (1)	I_{O2} = 1A		0.4	0.8	V
ΔV_{O1}	Line Regulation 1	$V_{I1} = V_{O1}$+2V to V_{O1}+7V, I_O = 250mA		15	30	mV
ΔV_{O2}	Line Regulation 2	$V_{I2} = V_{O2}$+2V to V_{O2}+7V, I_O = 500mA		15	40	mV
ΔV_{O1}	Load Regulation 1	$V_{I1} = V_{O1}$+2V, I_{O1} = 10 to 500mA		10		mV
ΔV_{O2}	Load Regulation 2	$V_{I2} = V_{O2}$+2V, I_{O2} = 10mA to 1A		60		mV
I_{STOT}	Total Supply Current	$I_{O1} = I_{O2}$ = NO LOAD		2		mA
I_S	1 Channel Supply Current	NO LOAD		1		mA
I_{QMAX}	Quiescent Current	I_{O1} = 500mA, I_{O2} = 1A		30		mA
I_{SC1}	Short Circuit Current 1	T_A = 25°	500	800		mA
I_{SC2}	Short Circuit Current 2	T_A = 25°	1	1.6		A
V_{INH-H}	Enable Voltage HIGH		2.4			V
V_{INH-L}	Enable Voltage LOW				0.8	V
I_{INH}	Enable Pin Current	V_{INH} = 5V		6		µA
SVR	Supply Voltage Rejection (2)	$V_{I1,2} = V_{O1,2}$ +3V ±1V, $I_{O1,2}$ = 10 mA, f = 120Hz		70		dB
e_N	RMS Output Noise (2)	Bandwidth of 10Hz to 100KHz		0.003		$\%V_O$

(1): This test is not performed for V_O<2.5V.
(2): Guaranteed by design, but not tested in production.

Figure 3: Typical Application Circuit



TYPICAL CHARACTERISTICS (unless otherwise specified T_j = 25°C)

Figure 4: Dropout Voltage (V_{O1}) vs Temperature

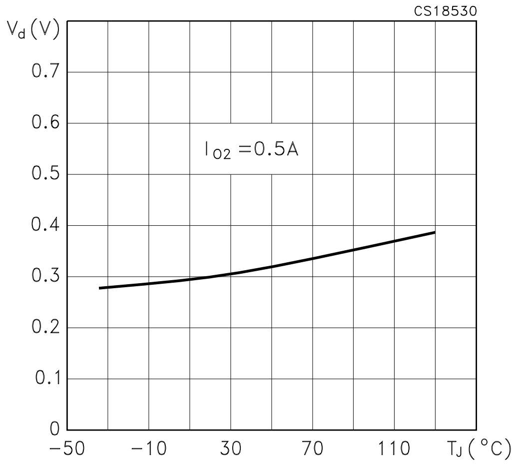


Figure 7: Output Voltage (V_{O2}) vs Temperature

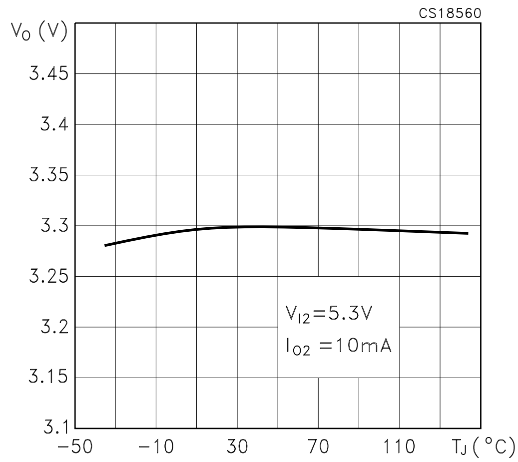


Figure 5: Dropout Voltage (V_{O2}) vs Temperature

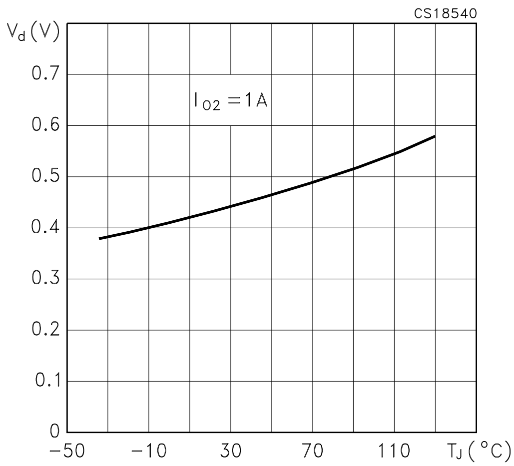


Figure 8: Line Regulation (V_{O1}) vs Temperature

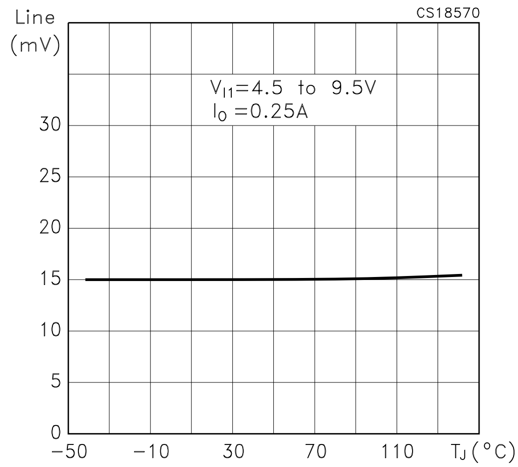


Figure 6: Output Voltage (V_{O1}) vs Temperature

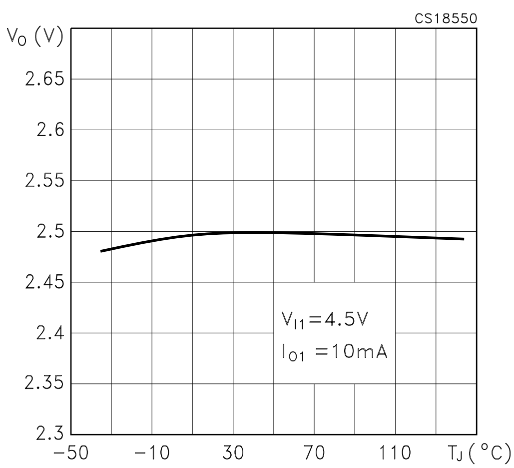


Figure 9: Load Regulation (V_{O1}) vs Temperature

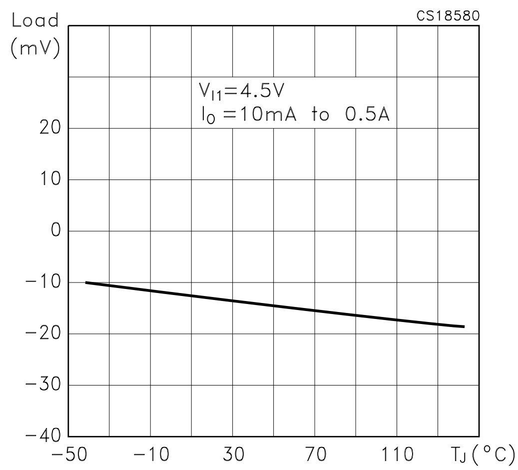


Figure 10: Line Regulation (V_{O2}) vs Temperature

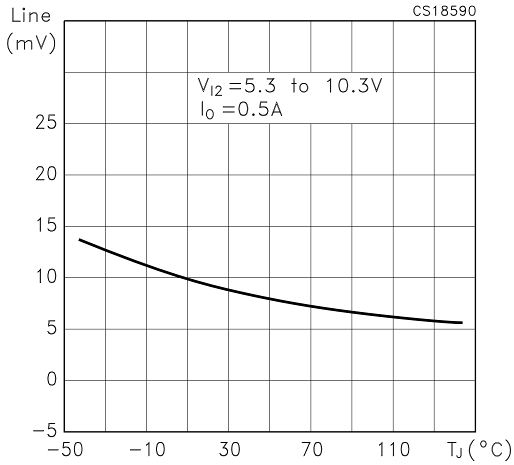


Figure 11: Load Regulation (V_{O2}) vs Temperature

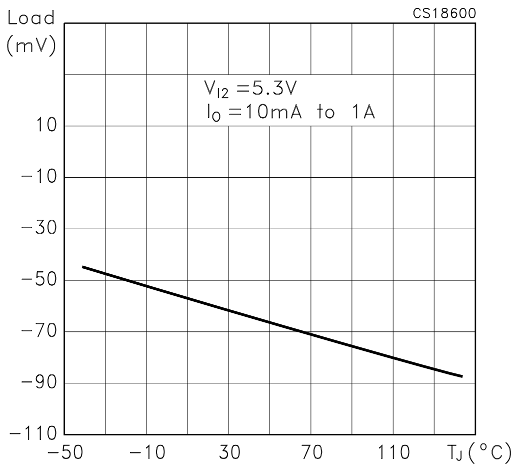


Figure 12: Short Circuit Current (V_{O1}) vs Drop Voltage

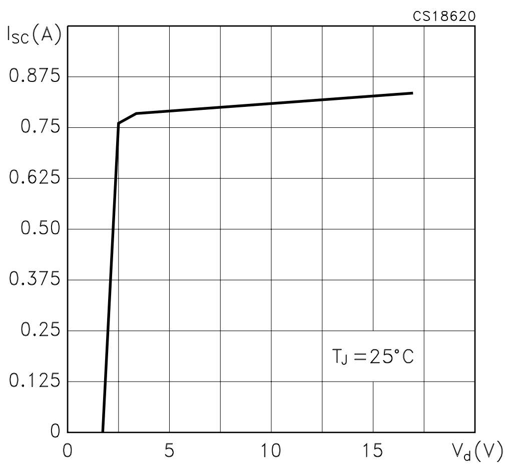


Figure 13: Short Circuit Current (V_{O2}) vs Drop Voltage

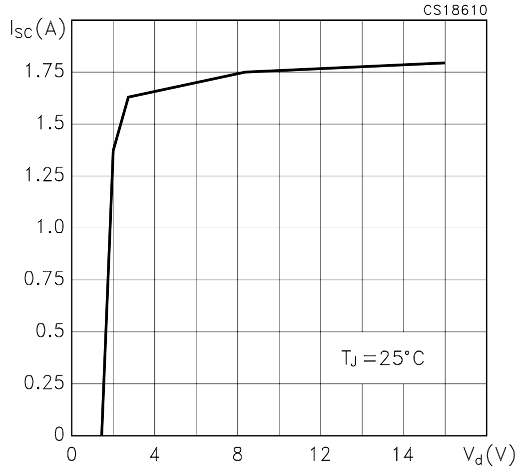


Figure 14: Inhibit Voltage vs Temperature

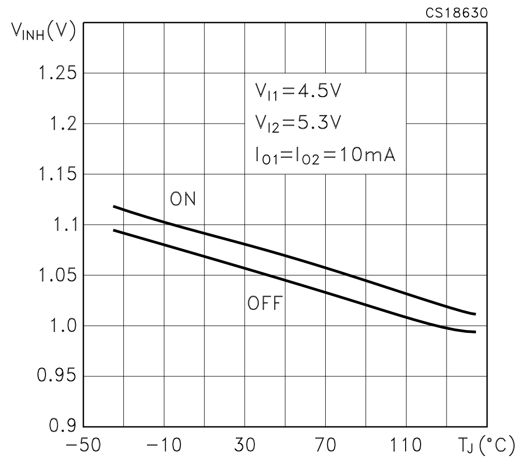
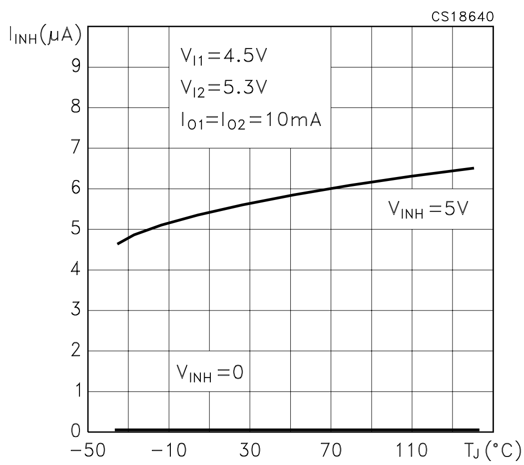


Figure 15: One Channel Inhibit Current vs Temperature



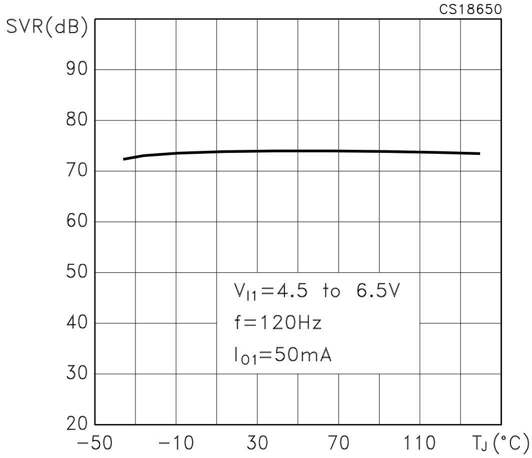


Figure 16: Supply Voltage Rejection vs (V_{O1}) Temperature

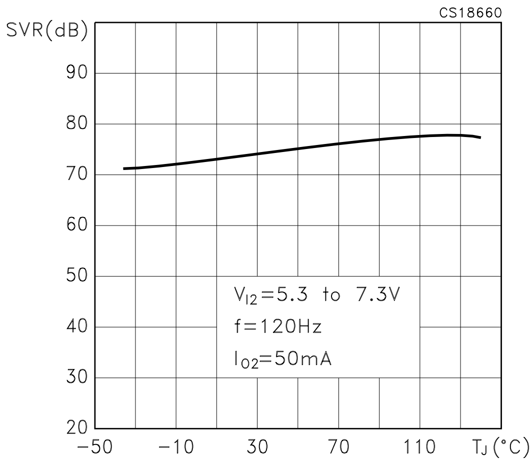


Figure 17: Supply Voltage Rejection vs (V_{O2}) Temperature

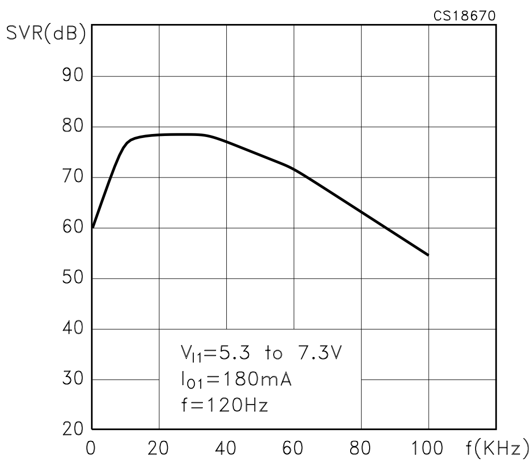


Figure 18: Supply Voltage Rejection (V_{O1}) vs Frequency

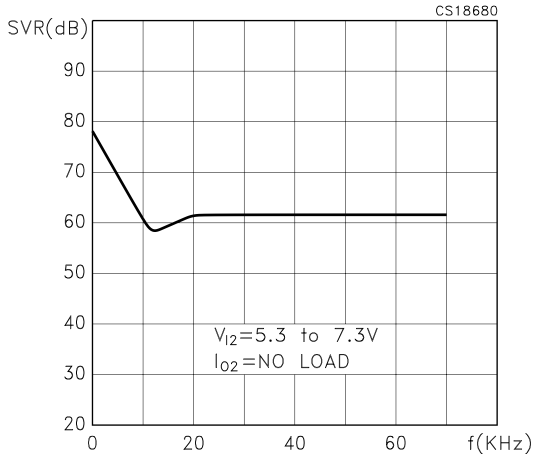


Figure 19: Supply Voltage Rejection (V_{O2}) vs Frequency

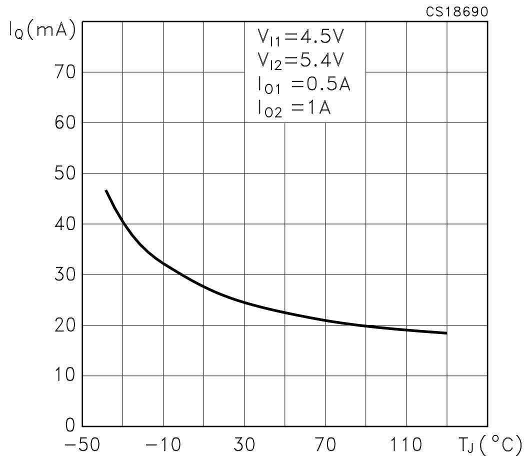


Figure 20: Maximum Total Quiescent Current vs Temperature

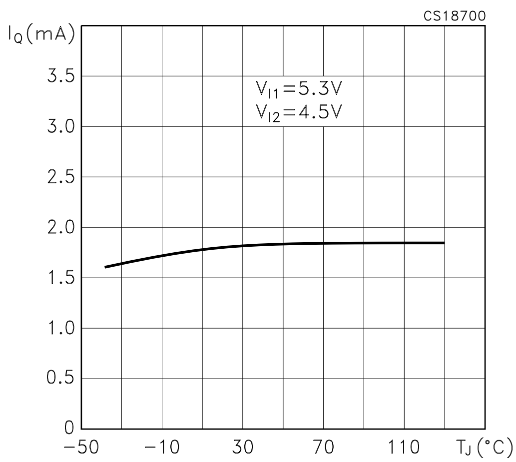


Figure 21: Total Supply Current vs Temperature

Figure 22: Quiescent Current (V_{O1}) vs Output Current

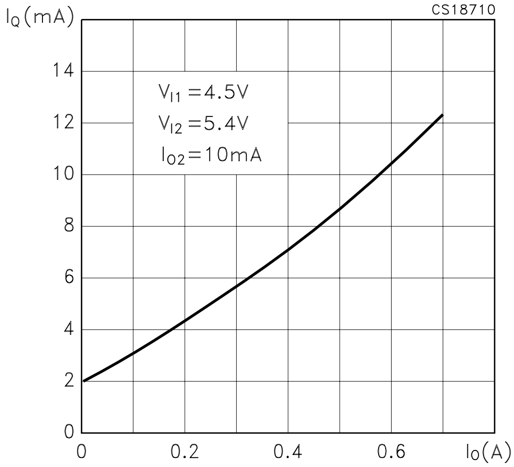


Figure 23: Quiescent Current (V_{O2}) vs Output Current

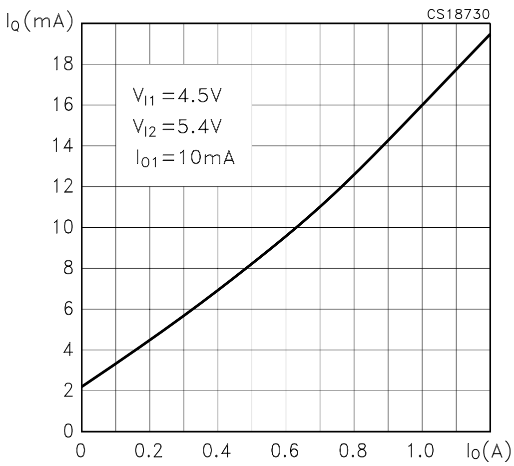


Figure 24: Thermal Protection vs V_{O1}

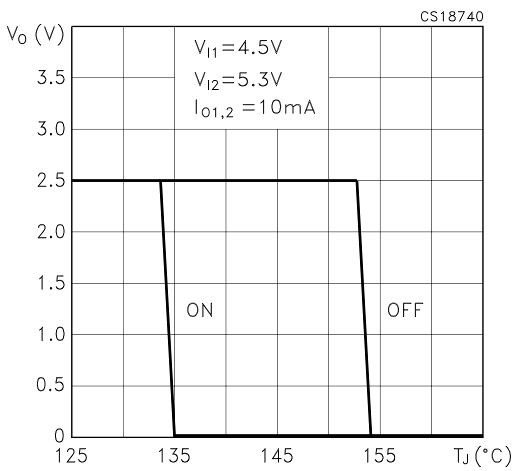
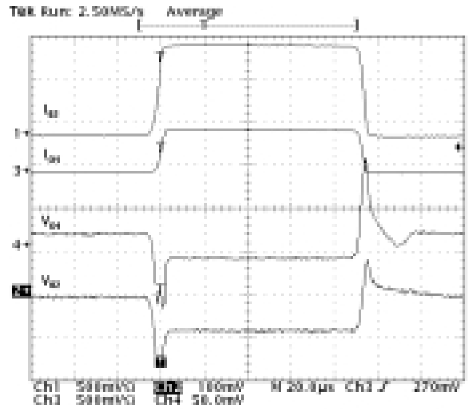
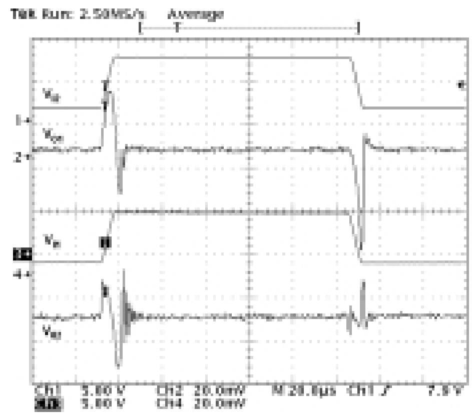


Figure 25: Load Transient



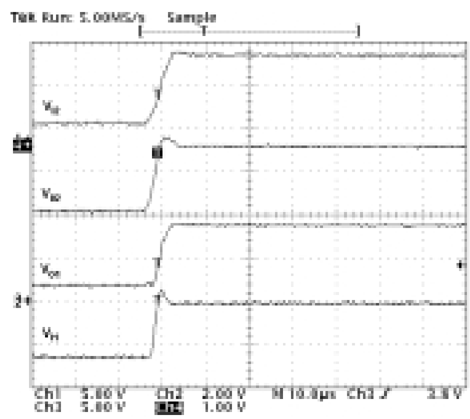
$C_{I1,2}$=1µF, $C_{O1,2}$=2.2µF, $V_{INH1,2}$=2.5V, V_{I1}=4.5V, V_{I2}=5.3V, I_{O1}=5mA to 0.5A, I_{O2}=5mA to 1A, t_{RISE}=t_{FALL}=4.2µs

Figure 26: Line Transient $V_{O1,2}$



$C_{I1,2}$=0, $C_{O1,2}$=2.2µF, V_{I1}=4.4 to 10.4V, V_{I2}=5.3 to 11.3V, I_{O1}=0.25A, I_{O2}=0.5A, t_{RISE}=t_{FALL}=4.4µs

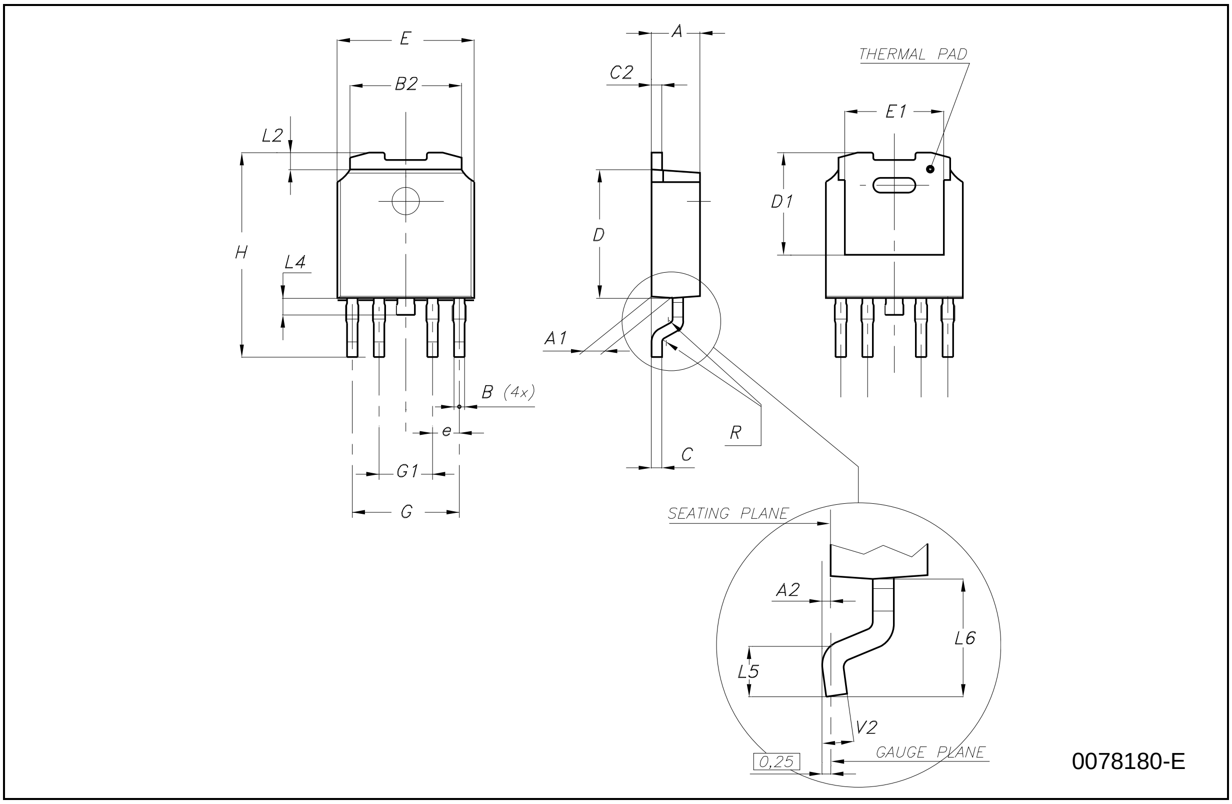
Figure 27: Start up Transient V_{O1}



V_{I1}=1.1 to 8.5V, V_{I2}=1.2 to 9.8V, I_{O1}=0.25A, I_{O2}=0.5A, t_{RISE}=5µs

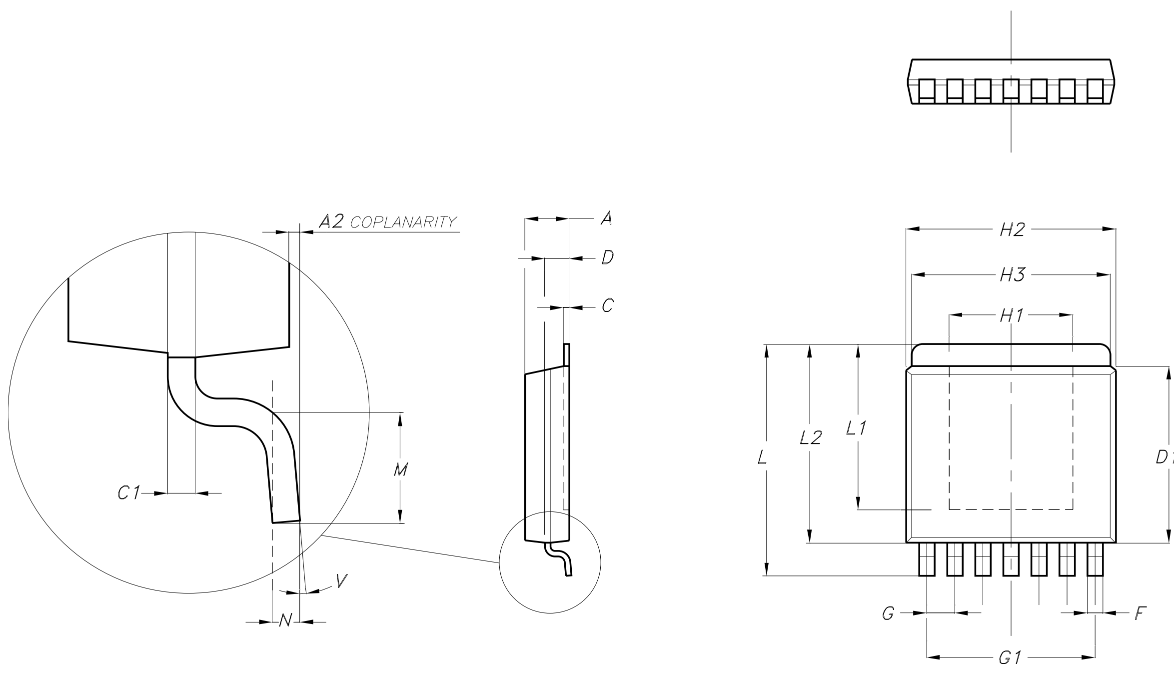
PPAK MECHANICAL DATA

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	



SPAK-7L MECHANICAL DATA

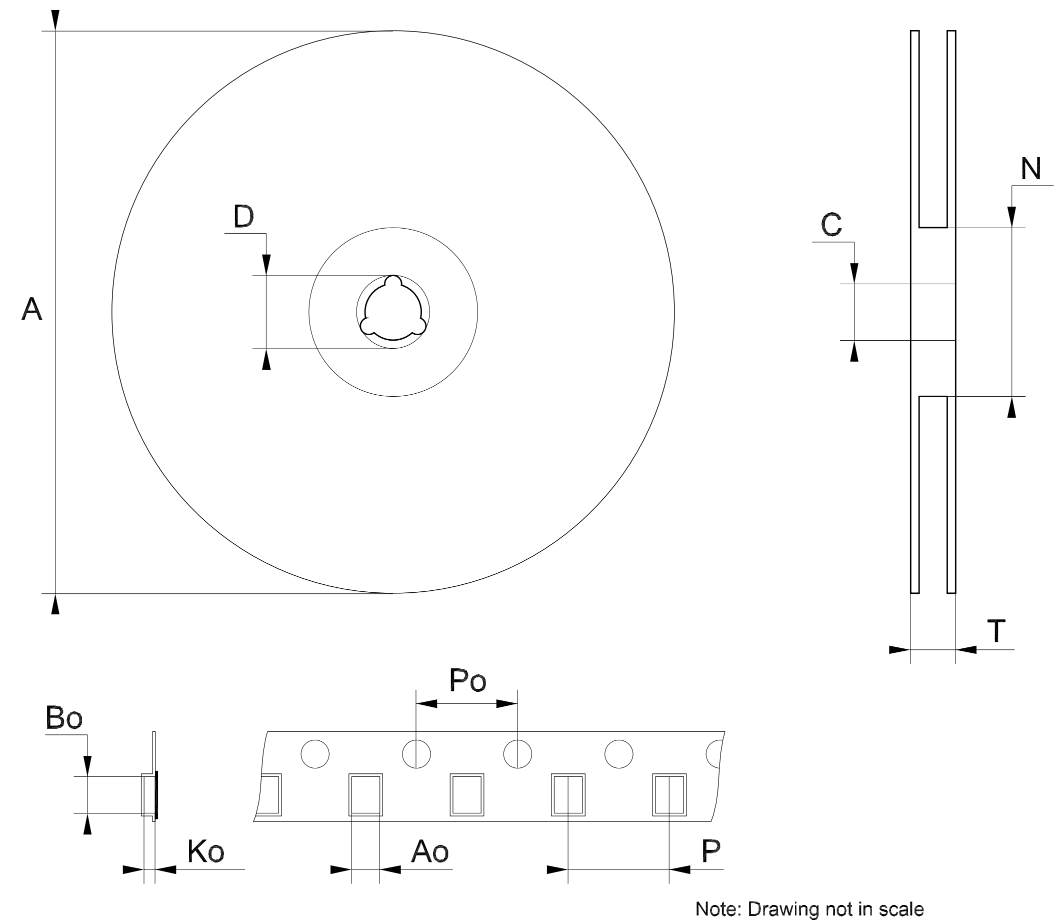
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.78		2.03	0.070		0.080
A2	0.03		0.13	0.001		0.005
C		0.25			0.010	
C1		0.25			0.010	
D	1.02		1.27	0.040		0.050
D1	7.87		8.13	0.310		0.320
F	0.63		0.79	0.025		0.031
G		1.27			0.050	
G1		7.62			0.3	
H1		5.59			0.220	
H2	9.27		9.52	0.365		0.375
H3	8.89		9.14	0.350		0.360
L	10.41		10.67	0.410		0.420
L1		7.49			0.295	
L2	8.89		9.14	0.350		0.360
M	0.79		1.04	0.031		0.041
N		0.25			0.010	
V	3°		6°	3°		6°



PO13F2/A

Tape & Reel SPAK-xL MECHANICAL DATA

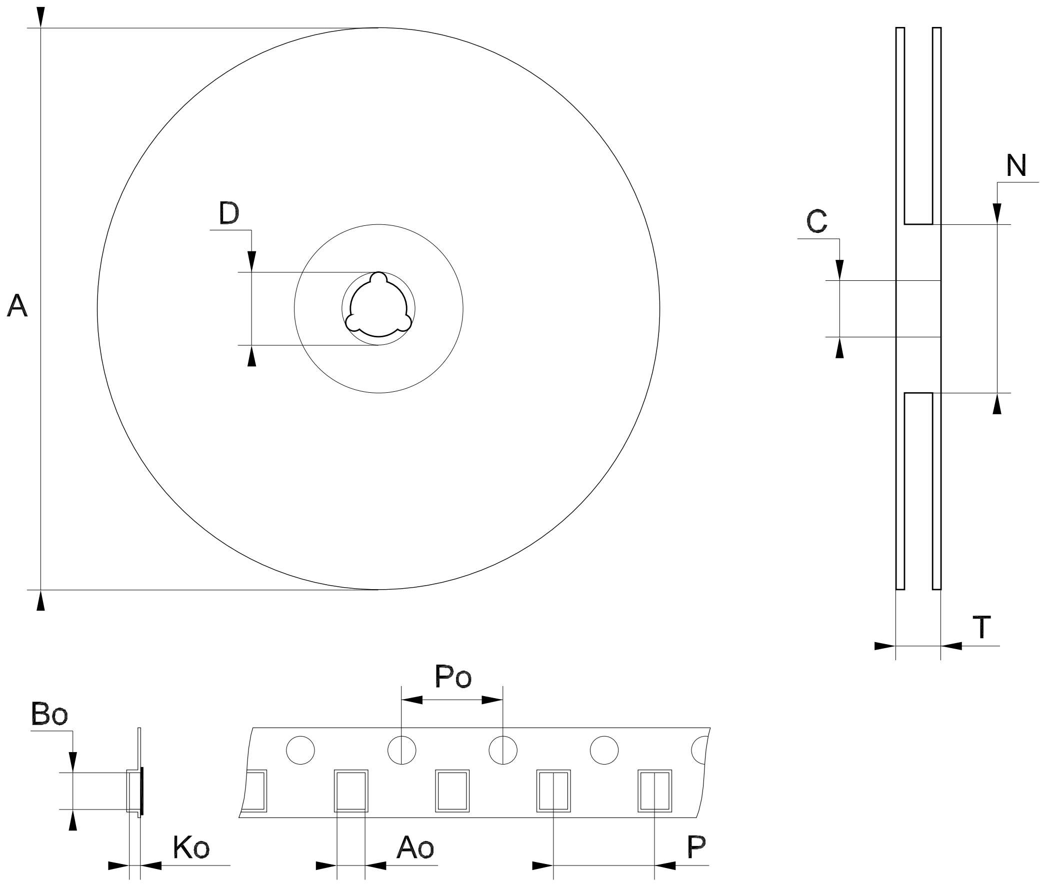
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			180			7.086
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			14.4			0.567
Ao	9.70	9.80	9.90	0.382	0.386	0.390
Bo	10.85	10.95	11.05	0.423	0.427	0.431
Ko	2.30	2.40	2.50	0.090	0.094	0.098
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	11.9	12.0	12.1	0.468	0.472	0.476



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

Table 6: Revision History

Date	Revision	Description of Changes
03-Aug-2004	2	Typing correction on tables 1, 3, 5 and figures 3, 6, 10, 11, 14, 17, 22, 23.