HT75Bxx
High PSRR 150mA LDO Regulator

Features

- Output Voltage: 1.5V/1.8V/2.5V/2.8V/3.0V/3.3V/5V
- High Output Voltage Accuracy: ±2%
- Low Voltage Drop: 330mV(Typ.) (V_{OUT}=2.5V@I_{OUT}=150mA)
- Maximum Input Voltage: 7.0V
- Guaranteed Output Current: 150mA
- Low Power Consumption: 10μA (Typ.)
- High ripple rejection: 70dB (1kHz@I_{OUT}=30mA)
- Power-Saving Shutdown Mode
- Current limiting
- SOT23-5 and SOT89 Package

Applications

- Portable communication equipment
- Portable music player
- Electrical appliances such as cameras, VCRs and camcorders
- Battery-powered equipment

General Description

The HT75Bxx series are CMOS-based voltage regulator devices with high output voltage accuracy, low quiescent current, low on-resistance, and high ripple rejection. Each of the devices includes a voltage reference, error amplifier, resistor-network for voltage setting, current limit circuit, chip enable circuit and so on.

The HT75Bxx's current limiters' fold back circuit also operates as a short circuit protect function for the output current limiter.

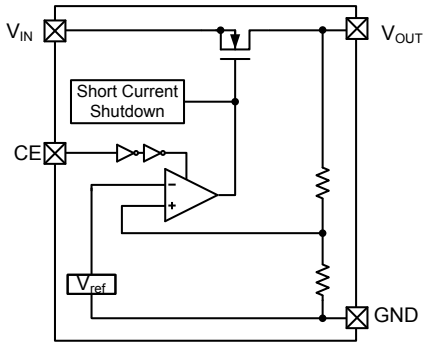
These devices offer the benefits of low dropout voltage as well as possessing a chip-enable function. Additional features include an exceptionally low 10μA quiescent current in addition to excellent line and load transient response characteristics. With these features the devices will be appropriate for use in a wide range of application among which would include hand-held communication equipment.

The space-saving SOT23-5, SOT89 package will be an attractive additional feature for pocket and hand-held applications.

Selection Table

Part No.	Output Voltage	Tolerance	Package
HT75B15	1.5V	±2%	SOT23-5 SOT89
HT75B18	1.8V		
HT75B25	2.5V		
HT75B28	2.8V		
HT75B30	3.0V		
HT75B33	3.3V		
HT75B50	5.0V		

Block Diagram



Absolute Maximum Ratings (Note1)

Maximum Input Supply Voltage.....7.5V
Ambient Temperature Range.....-40°C ~ +85°C

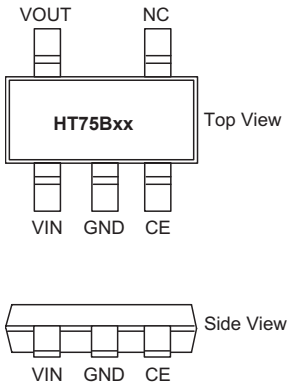
Thermal Information

Symbol	Parameter	Package	Max.	Unit
Q_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23-5	500	°C/W
		SOT89	200	°C/W
P_D	Power Dissipation	SOT23-5	0.20	W
		SOT89	0.50	W

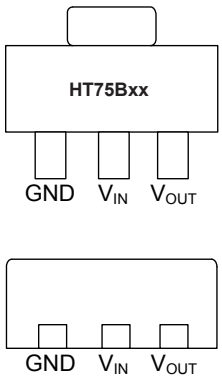
Note: P_D is measured at Ta= 25°C

Pin Assignment

SOT23-5



SOT89



SOT23-5 Pin Descriptions		
Pin No.	**Symbol**	**Description**
1	VIN	Input Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin - high enable
4	NC	No Connection
5	VOUT	Output Pin

SOT89 Pin Descriptions		
Pin No.	**Symbol**	**Description**
1	GND	Ground Pin
2	VIN	Input Pin
3	VOUT	Output Pin

Electrical Characteristics

Ta=25°C, $V_{IN}=V_{OUT}+1V$, $I_{OUT}=30mA$, unless otherwise specified (Note2)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{IN}	Input Voltage	$1.5V \le V_{OUT} \le 5V$		2.5	—	7	V
ΔV_{OUT}	Output Voltage Tolerance	$1mA \le I_{OUT} \le 30mA$ $1.5V \le V_{OUT} \le 5.0V$		-2	—	+2	%
ΔV_{LINE}	Line Regulation	$V_{OUT}+0.5V \le V_{IN} \le 7.0V$, $I_{OUT}=10mA$		—	0.02	0.1	%/V
ΔV_{LOAD}	Load Regulation (Note 3)	$1mA \le I_{OUT} \le 150mA$	$1.5V \le V_{OUT} \le 1.8V$	—	13	30	mV
			$2.5V \le V_{OUT} \le 3.0V$	—	14	35	
			$V_{OUT} \ge 3.3V$	—	15	40	
V_{DROP}	Dropout Voltage (Note 4)	$\Delta V_{OUT}=2\%$ $I_{OUT}=150mA$	$V_{OUT}=1.5V$	—	0.54	0.86	V
			$V_{OUT}=1.8V$	—	0.44	0.65	
			$2.5V \le V_{OUT} \le 5.0V$	—	0.33	0.46	
I_{SHORT}	Short Current Limit	$V_{OUT}=0V$		—	50	—	mA
I_{SS}	Supply Current	$I_{OUT}=0mA$		—	10	20	μA
I_{SD}	Shutdown Current	CE=GND		—	0.1	1	μA
V_{IH}	CE Input High Threshold	$V_{OUT}+1V \le V_{IN} \le 7V$		1	—	7	V
V_{IL}	CE Input Low Threshold	$V_{OUT}+1V \le V_{IN} \le 7V$		0	—	0.3	V
R_R	Ripple Rejection	$I_{OUT}=30mA$	f=1kHz	—	70	—	dB
			f=10kHz	—	53	—	
V_{NOISE}	Output Noise	Bandwidth=10Hz to 100kHz		—	30	—	μVrms
T_C	Temperature Coefficient	$T_C=\frac{\Delta V_{OUT}}{\Delta T_a \bullet V_{OUT}}$ $I_{OUT}=30mA$, $-40°C \le Ta \le 85°C$		—	±100	—	ppm/°C

Note 1. Absolute maximum ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. The guaranteed specifications apply only for the test conditions listed.

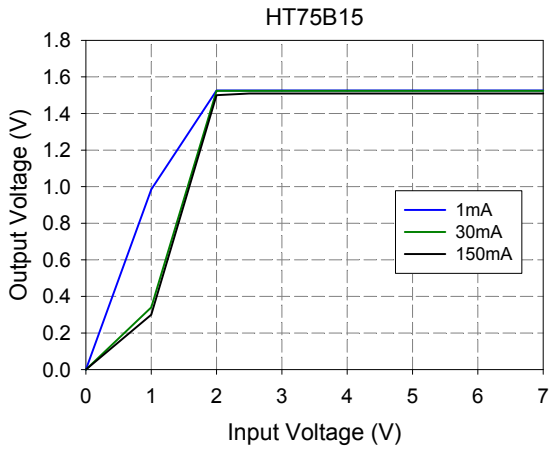
2. Specifications are production tested at T_a=room temperature. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

3. Load regulation is measured at constant junction temperature, using pulse testing with a short ON time. The devices are guaranteed up to the maximum power dissipation. Power dissipation is determined by the input/output differential voltage and the output current. Guaranteed maximum power dissipation will not be available over the full input/output range. The maximum allowable power dissipation at any ambient temperature is $P_D=(T_{J(MAX)}-T_a)/\theta_{JA}$.

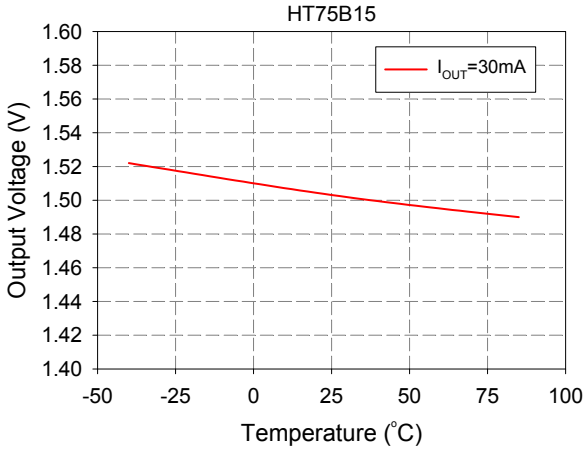
4. Dropout voltage is the minimum input to output voltage differential needed to maintain regulation at a specified output current. Under dropout conditions, the output voltage will be equal to: $V_{IN} - V_{DROP}$.

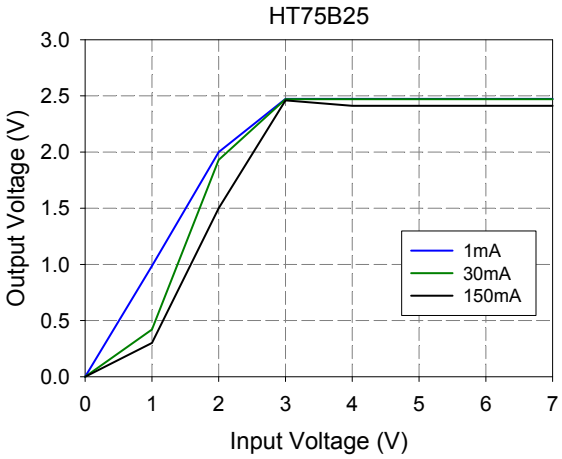
Typical Characteristics

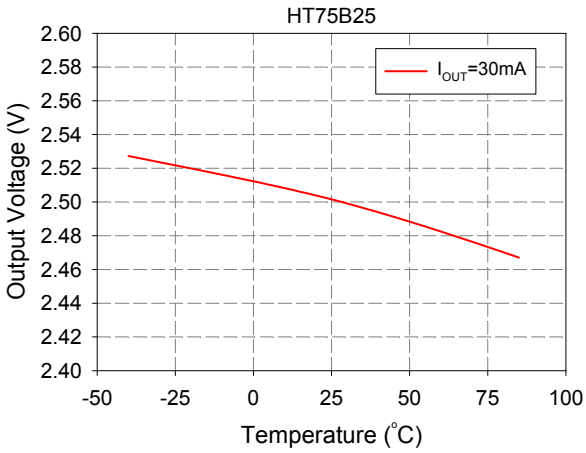
Output Voltage vs. Input Voltage

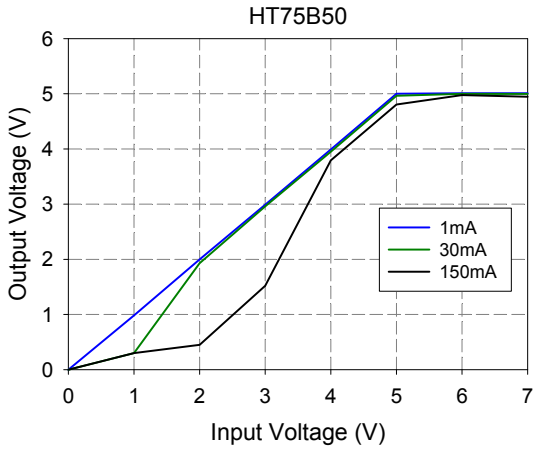


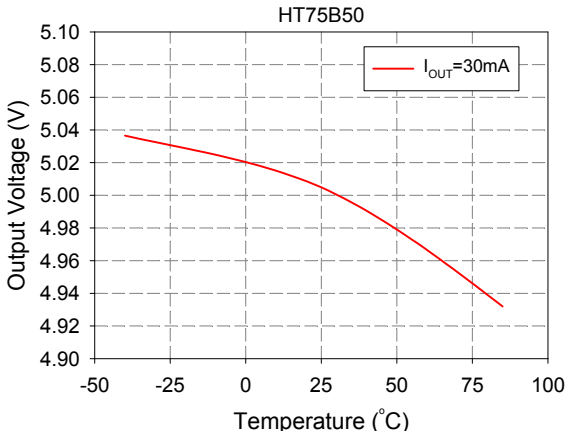
Output Voltage vs. Temperature



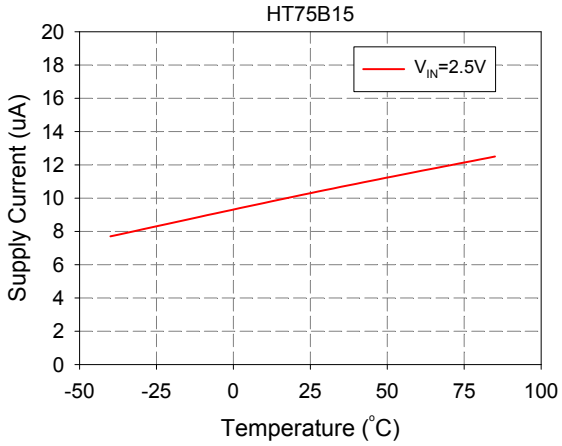




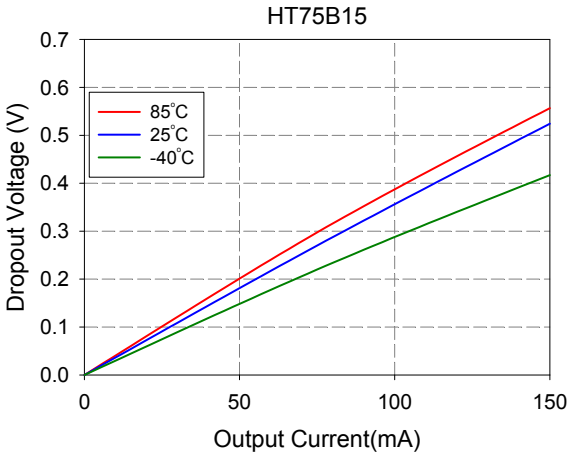


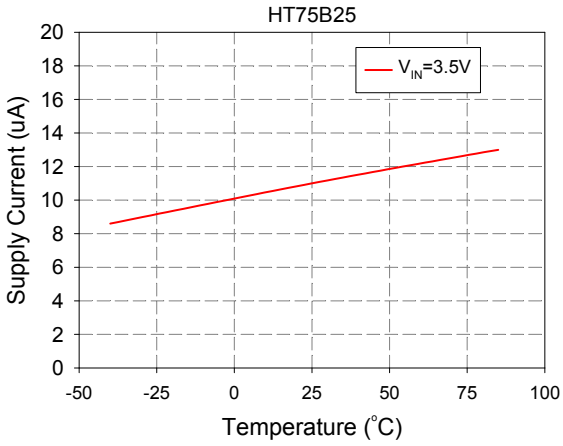


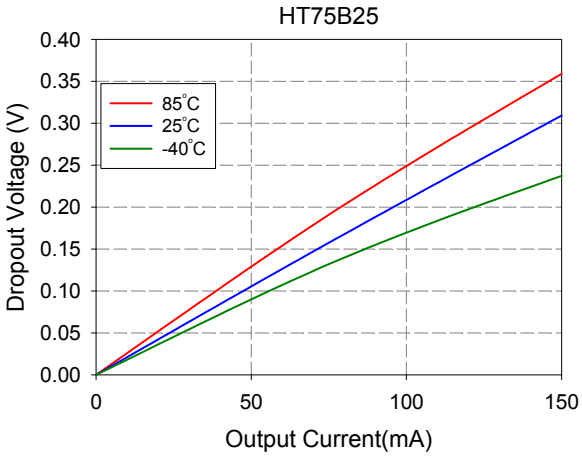
Supply Current vs. Temperature

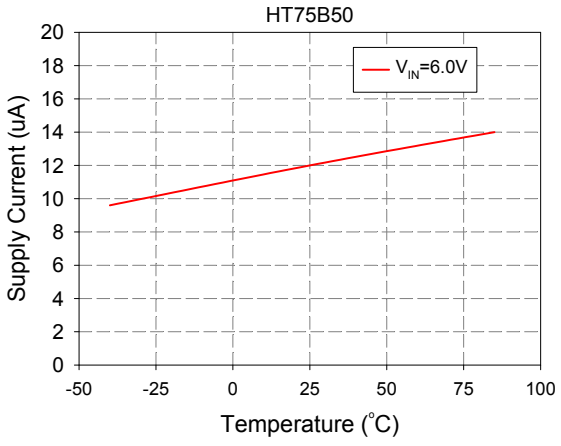


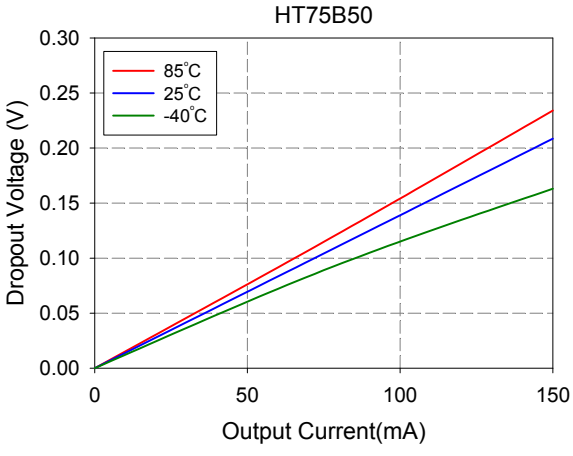
Dropout Voltage vs. Output Current



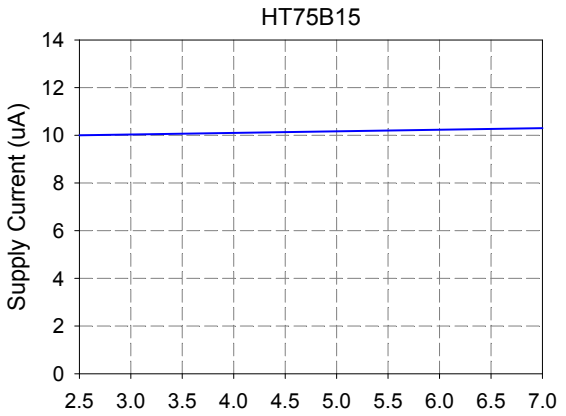


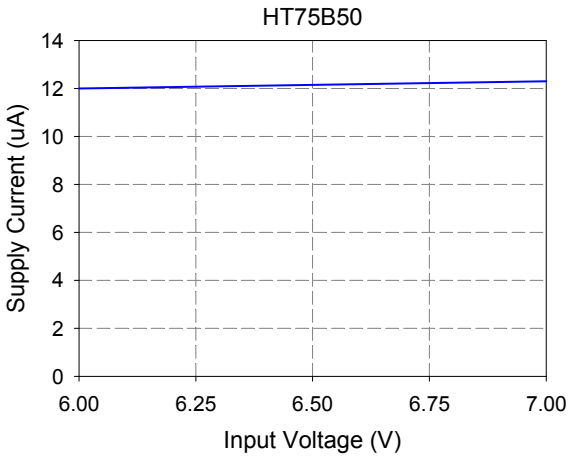




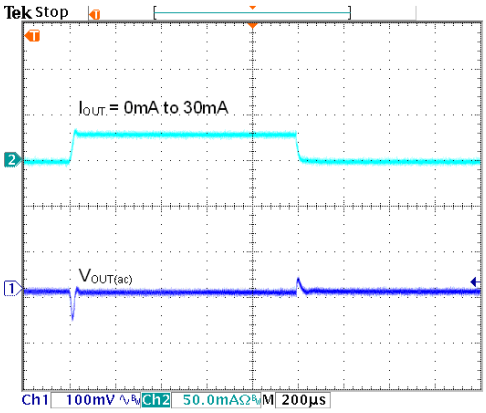


Supply Current vs. Input Voltage

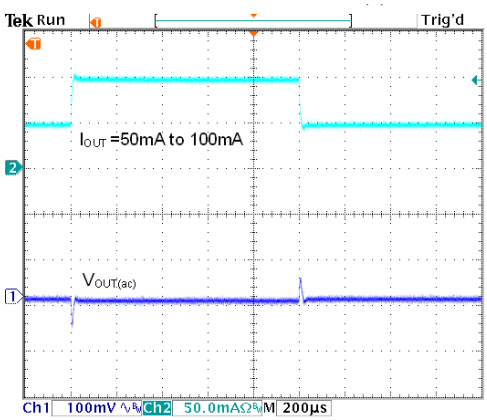




Load Transient Response

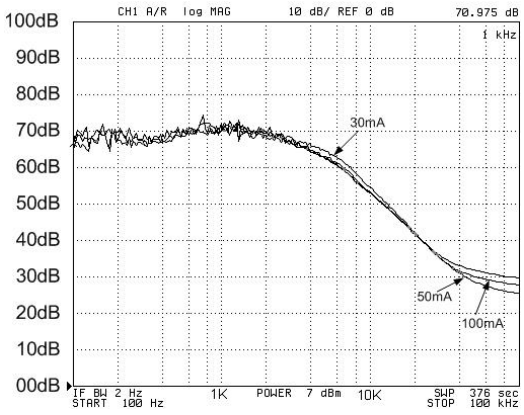


HT75B15 V_{IN}=2.5V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}

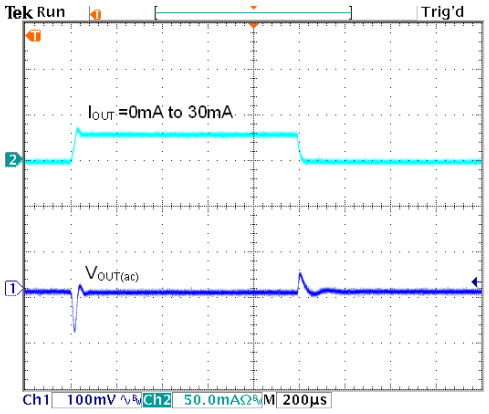


HT75B15 V_{IN}=2.5V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}

Ripple Rejection vs. Frequency

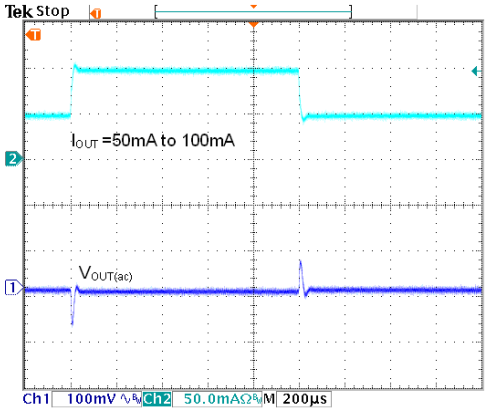


HT75B15 V_{OUT}=1.5V, V_{IN}=2.5V, I_{OUT}=30, 50, 100mA

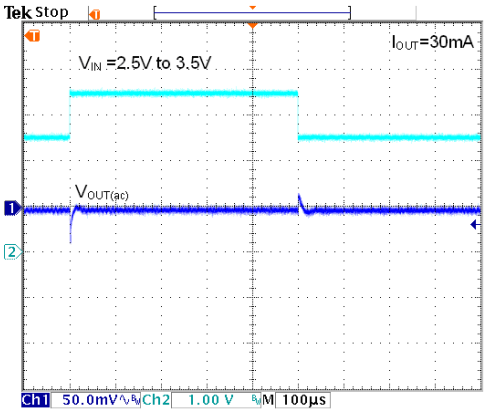


HT75B25 V_{IN}=3.5V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}

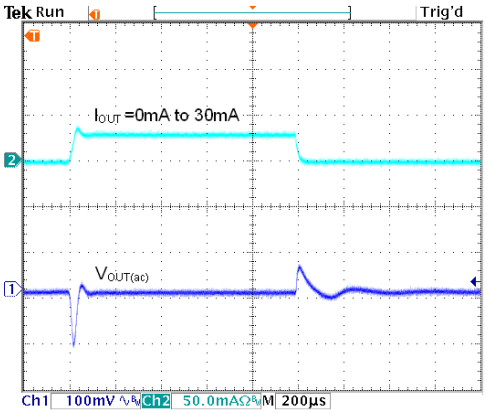
Input Transient Response



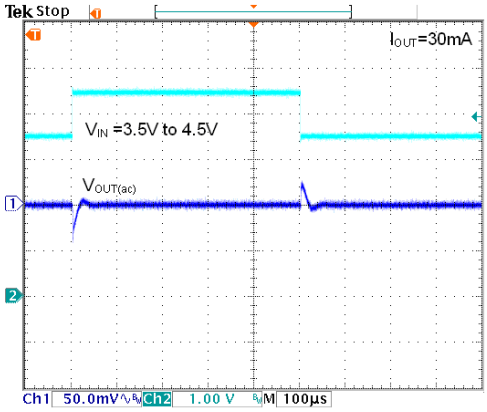
HT75B25 V_{IN}=3.5V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}



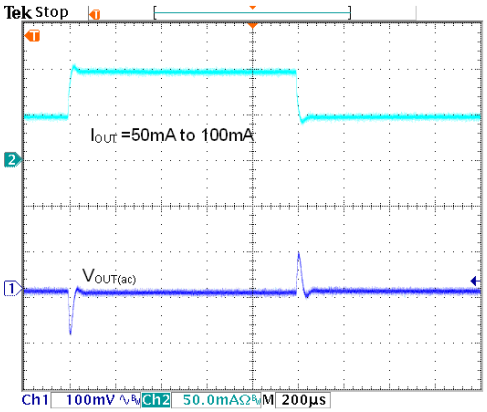
HT75B15 C_{IN}=0µF, C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=V_{IN}



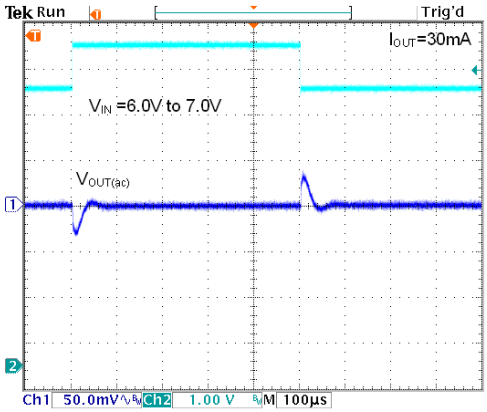
HT75B50 V_{IN}=6.0V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}



HT75B25 C_{IN}=0µF, C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=V_{IN}

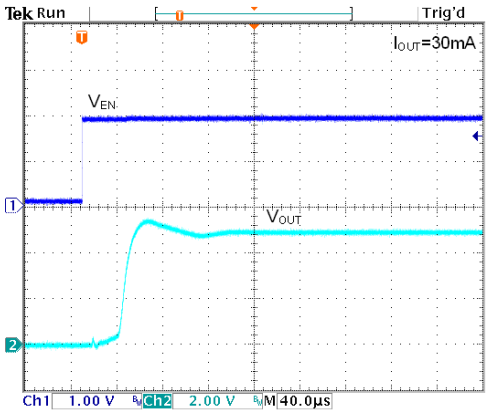


HT75B50 V_{IN}=6.0V, C_{IN}=C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=I_{OUT}

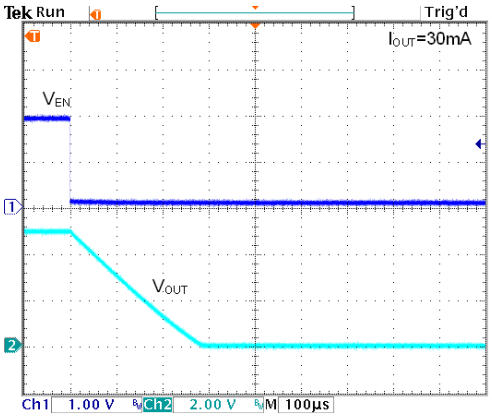


HT75B50 C_{IN}=0µF, C_{OUT}=1µF, CH1=$V_{OUT(ac)}$; CH2=V_{IN}

Turn-on/off Speed With CE Pin

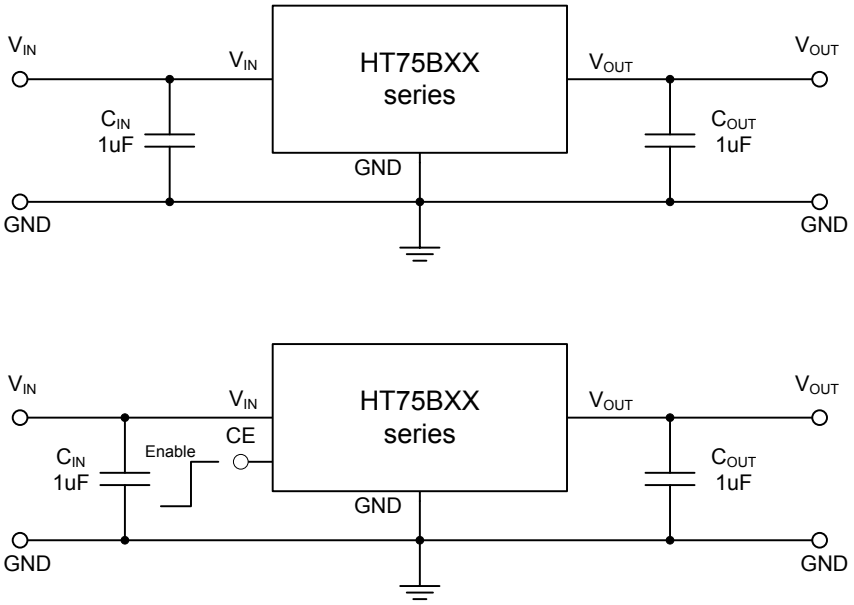


HT75B50 V_{IN}=6.0V, C_{IN}=C_{OUT}=1µF, CH1=V_{CE}; CH2=V_{OUT}



HT75B50 V_{IN}=6.0V, C_{IN}=C_{OUT}=1µF, CH1=V_{CE}; CH2=V_{OUT}

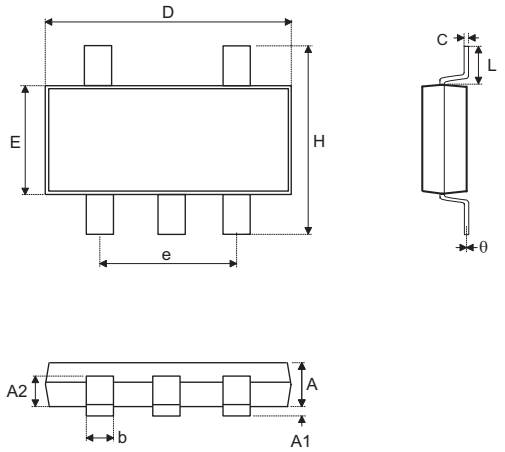
Application Circuit



Package Information

Note that the package information provided here is for consultation purposes only. As this information may be updated at regular intervals users are reminded to consult the Holtek website (http://www.holtek.com.tw/english/literature/package.pdf) for the latest version of the package information.

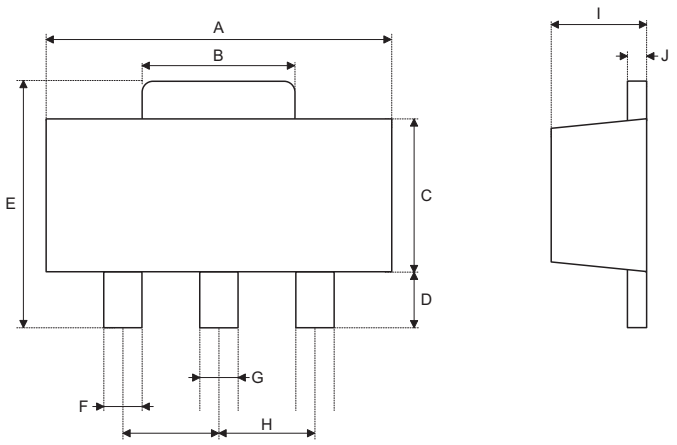
5-pin SOT23-5 Outline Dimensions



Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	0.039	—	0.051
A1	—	—	0.004
A2	0.028	—	0.035
b	0.014	—	0.020
C	0.004	—	0.010
D	0.106	—	0.122
E	0.055	—	0.071
e	—	0.075	—
H	0.102	—	0.118
L	0.015	—	—
θ	0°	—	9°

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	1.00	—	1.30
A1	—	—	0.10
A2	0.70	—	0.90
b	0.35	—	0.50
C	0.10	—	0.25
D	2.70	—	3.10
E	1.40	—	1.80
e	—	1.90	—
H	2.60	—	3.0
L	0.37	—	—
θ	0°	—	9°

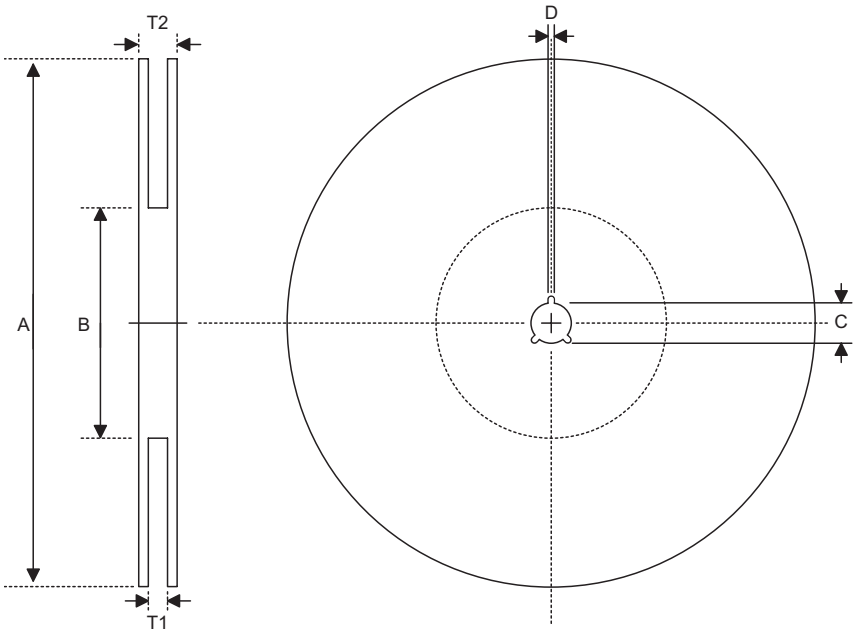
3-pin SOT89 Outline Dimensions



Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	0.173	—	0.181
B	0.059	—	0.072
C	0.090	—	0.102
D	0.035	—	0.047
E	0.155	—	0.167
F	0.014	—	0.019
G	0.017	—	0.022
H	—	0.059	—
I	55	—	63
J	14	—	17

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	4.39	—	4.60
B	1.50	—	1.83
C	2.29	—	2.59
D	0.89	—	1.19
E	3.94	—	4.24
F	0.36	—	0.48
G	0.43	—	0.56
H	—	1.50	—
I	1.40	—	1.60
J	0.36	—	0.43

Reel Dimensions



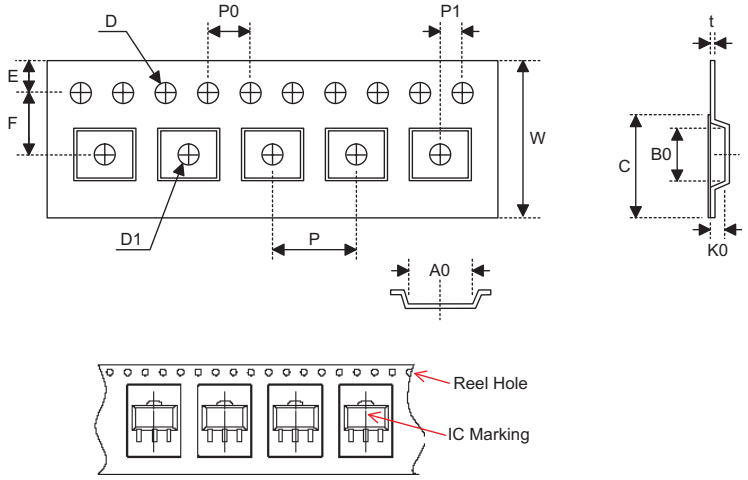
SOT23-5

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	178.0±1.0
B	Reel Inner Diameter	62.0±1.0
C	Spindle Hole Diameter	13.0±0.2
D	Key Slit Width	2.50±0.25
T1	Space Between Flang	8.4 $^{+1.5/-0.0}$
T2	Reel Thickness	11.4 $^{+1.5/-0.0}$

SOT89-3

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	180.0±1.0
B	Reel Inner Diameter	62.0±1.5
C	Spindle Hole Diameter	12.75 $^{+0.15/-0.00}$
D	Key Slit Width	1.9±0.15
T1	Space Between Flang	12.4 $^{+0.2/-0.0}$
T2	Reel Thickness	17.0 $^{+0.0/-0.4}$

Carrier Tape Dimensions



SOT23-5

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	8.0±0.3
P	Cavity Pitch	4.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation(Width Direction)	3.50±0.05
D	Perforation Diameter	$1.5^{+0.1/-0.0}$
D1	Cavity Hole Diameter	$1.5^{+0.1/-0.0}$
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation(Length Direction)	2.00±0.05
A0	Cavity Length	3.15±0.10
B0	Cavity Width	3.2±0.1
K0	Cavity Depth	1.4±0.1
t	Carrier Tape Thickness	0.20±0.03
C	Cover Tape Width	5.3±0.1

SOT89-3

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	$12.0^{+0.3/-0.1}$
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.10
F	Cavity to Perforation(Width Direction)	5.50±0.05
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.1
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation(Length Direction)	2.0±0.1
A0	Cavity Length	4.8±0.1
B0	Cavity Width	4.5±0.1
K0	Cavity Depth	1.8±0.1
t	Carrier Tape Thickness	0.300±0.013
C	Cover Tape Width	9.3±0.1

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