

**1A LOW DROPOUT LINEAR REGULATOR****AP2218****General Description**

The AP2218 is a low dropout linear regulator with a typical dropout of 300mV at 1A output current.

The AP2218 provides current limit and thermal shutdown. On-chip thermal shutdown provides protection against any combination of high current and ambient temperature that would create excessive junction temperatures.

The AP2218 has 3.3V and 5.0V versions.

The AP2218 is available in the industry standard TO-220F-4 package.

**Features**

- Minimum Guaranteed Output Current: 1A
- Dropout Voltage at  $I_{OUT}=1A$ : 300mV
- Output Accuracy:  $\pm 1\%$
- Low Ground Current
- Internal Current Limit and Thermal Protection
- Reversed-battery and Reversed-lead Insertion Protection
- Fast Transient Response

**Applications**

- Power Module
- Set Top Box
- LCD TV
- PDP TV
- Cordless Phone

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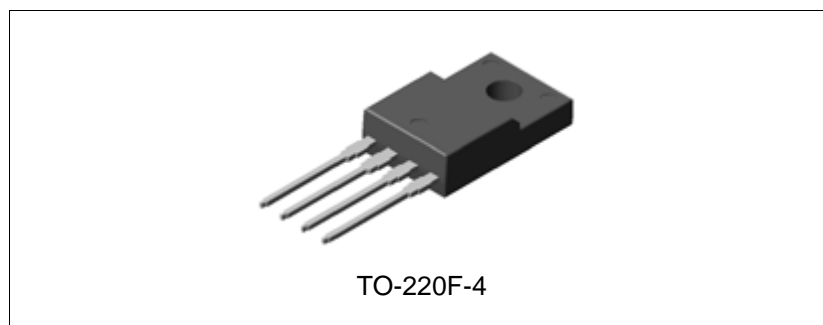


Figure 1. Package Type of AP2218



**1A LOW DROPOUT LINEAR REGULATOR** **AP2218**

**Pin Configuration**

T Package  
(TO-220F-4)

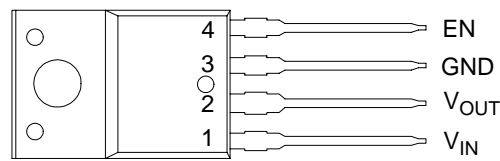


Figure 2. Pin Configuration of AP2218 (Top View)

**Pin Description**

Pin Number	Pin Name	Function
1	$V_{IN}$	Unregulated Input.
2	$V_{OUT}$	Regulated Output.
3	GND	Ground pin. This pin and TAB are internally connected.
4	EN	Logic high enable input.



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**Functional Block Diagram**

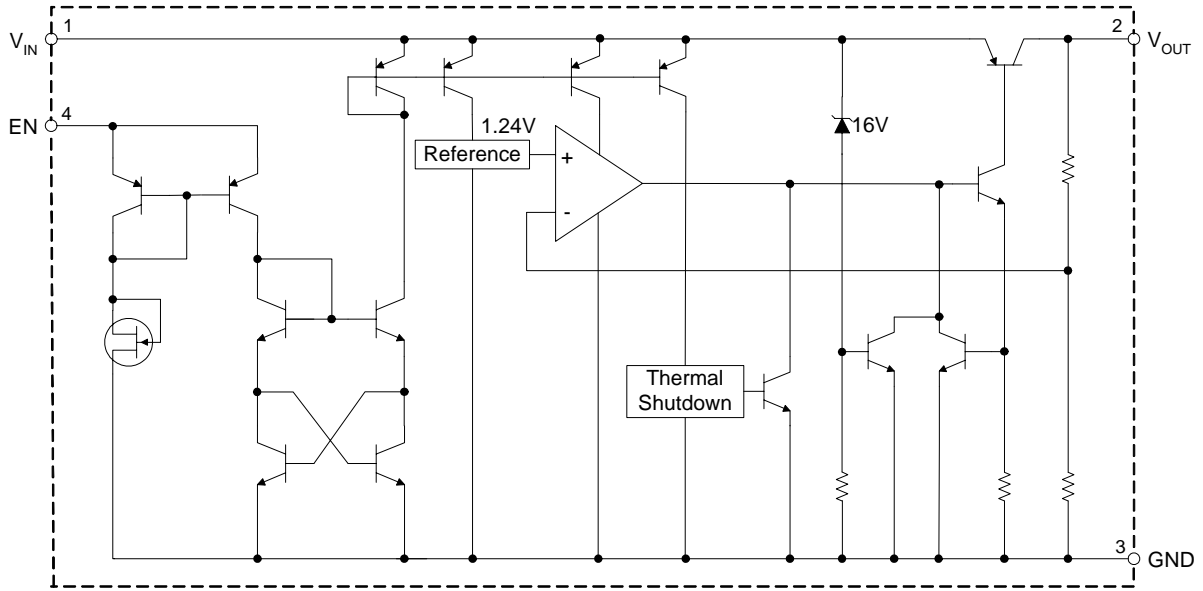
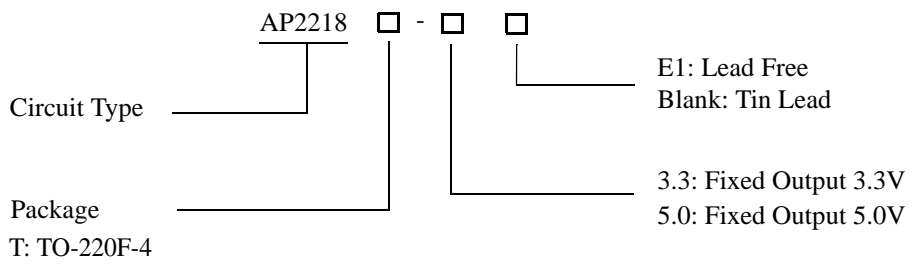


Figure 3. Functional Block Diagram of AP2218

**Ordering Information**



**1A LOW DROPOUT LINEAR REGULATOR****AP2218****Ordering Information (Continued)**

Package	Temperature Range	Part Number		Marking ID		Package Type
		Tin Lead	Lead Free	Tin Lead	Lead Free	
TO-220F-4	-40 to 125°C	AP2218T-3.3	AP2218T-3.3E1	AP2218T-3.3	AP2218T-3.3E1	Tube
		AP2218T-5.0	AP2218T-5.0E1	AP2218T-5.0	AP2218T-5.0E1	Tube

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant.

**Absolute Maximum Ratings (Note 1)**

Parameter	Symbol	Value	Unit
Supply Voltage	$V_{IN}$	15	V
Maximum Operating Junction Temperature	$T_J$	150	°C
Storage Temperature Range	$T_{STG}$	-65 to 150	°C
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	300	°C
ESD (Machine Model)		350	V
ESD (Human Body Model)		2000	V

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

**Recommended Operating Conditions**

Parameter	Symbol	Min	Max	Unit
Supply Voltage	$V_{IN}$		8	V
Operating Junction Temperature	$T_J$	-40	125	°C



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**Electrical Characteristics**

**AP2218-3.3V Electrical Characteristics**

Operating Conditions:  $V_{IN}=4.3V$ ,  $C_{IN}=10\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_J=25^\circ C$ , unless otherwise specified. The **Boldface** applies over  $-40^\circ C \leq T_J \leq 125^\circ C$ . ( $P \leq$  maximum power dissipation.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Output Voltage	$V_{OUT}$	$I_{OUT}=10mA$	3.27	3.3	3.33	V	
		$10mA \leq I_{OUT} \leq 1A$ , $4.3V \leq V_{IN} \leq 6.3V$ (Note 2)	<b>3.23</b>		<b>3.37</b>	V	
Line Regulation	$V_{RLINE}$	$I_{OUT}=10mA$ , $4.3V \leq V_{IN} \leq 8V$		3.3	33	mV	
Load Regulation	$V_{RLOAD}$	$V_{IN}=4.3V$ , $10mA \leq I_{OUT} \leq 1A$		6.6	50	mV	
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=10mA$		<b>66</b>	<b>330</b>	$\mu V/^\circ C$	
Dropout Voltage (Note 3)	$V_{DROP}$	$\Delta V_{OUT}=1\%$		70	<b>200</b>	mV	
			$I_{OUT}=100mA$		300	<b>550</b>	mV
Ground Current	$I_{GND}$	$V_{IN}=4.3V$	$I_{OUT}=750mA$		6	<b>15</b>	mA
			$I_{OUT}=1A$		10		mA
Current Limit	$I_{LIMIT}$	$V_{OUT}=0V$ (Note 4)	1.5	2.2		A	
Minimum Load Current	$I_{LOAD(MIN)}$			1	5	mA	
Output Noise Voltage (rms)		10Hz to 100KHz, $I_{OUT}=100mA$ , $C_{OUT}=10\mu F$		400		$\mu V$	
<b>Enable Input</b>							
Enable Input Voltage	$V_{EN}$	Logic low (off)			<b>0.8</b>	V	
		Logic high (on)	2.25			V	
Enable Input Current	$I_{IN}$	$V_{EN}=2.25V$	1	15	30 <b>75</b>	$\mu A$	
		$V_{EN}=0.8V$			2 <b>4</b>	$\mu A$	
Shutdown Output Current	$I_{OUT(SHDN)}$	(Note 5)		10	<b>20</b>	$\mu A$	

Note 2: For the details of  $V_{IN}$  range, please refer to  $(V_{IN}-V_{OUT}) * I_{LOAD} \leq$  maximum power dissipation (Figure 4).

Note 3: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value which is measured at  $V_{OUT}+1V$  applied to  $V_{IN}$ .

Note 4:  $V_{IN}=V_{OUT(NOMINAL)}+1V$ .

Note 5:  $V_{EN} \leq 0.8V$ ,  $V_{IN} \leq 8V$ ,  $V_{OUT}=0V$ .



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**Electrical Characteristics (Continued)**

**AP2218-5.0V Electrical Characteristics**

Operating Conditions:  $V_{IN}=6V$ ,  $C_{IN}=10\mu F$ ,  $C_{OUT}=10\mu F$ ,  $T_J=25^\circ C$ , unless otherwise specified. The **Boldface** applies over  $-40^\circ C \leq T_J \leq 125^\circ C$ . ( $P \leq$  maximum power dissipation.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Output Voltage	$V_{OUT}$	$I_{OUT}=10mA$	4.95	5.0	5.05	V	
		$10mA \leq I_{OUT} \leq 1A$ , $6V \leq V_{IN} \leq 8V$ (Note 2)	<b>4.90</b>		<b>5.10</b>	V	
Line Regulation	$V_{RLINE}$	$I_{OUT}=10mA$ , $6V \leq V_{IN} \leq 8V$		5	50	mV	
Load Regulation	$V_{RLOAD}$	$V_{IN}=6V$ , $10mA \leq I_{OUT} \leq 1A$		10	75	mV	
Output Voltage Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=10mA$		<b>100</b>	<b>500</b>	$\mu V/^\circ C$	
Dropout Voltage (Note 3)	$V_{DROP}$	$\Delta V_{OUT}=1\%$	$I_{OUT}=100mA$		70	<b>200</b>	mV
			$I_{OUT}=1A$		300	<b>550</b>	mV
Ground Current	$I_{GND}$	$V_{IN}=6V$	$I_{OUT}=750mA$		6	<b>15</b>	mA
			$I_{OUT}=1A$		10		mA
Current Limit	$I_{LIMIT}$	$V_{OUT}=0V$ (Note 4)	1.5	2.2		A	
Minimum Load Current	$I_{LOAD(MIN)}$			1	5	mA	
Output Noise Voltage (rms)		10Hz to 100KHz, $I_{OUT}=100mA$ , $C_{OUT}=10\mu F$		400		$\mu V$	
<b>Enable Input</b>							
Enable Input Voltage	$V_{EN}$	Logic low (off)			<b>0.8</b>	V	
		Logic high (on)	2.25			V	
Enable Input Current	$I_{IN}$	$V_{EN}=2.25V$	1	15	30 <b>75</b>	$\mu A$	
		$V_{EN}=0.8V$			2 <b>4</b>	$\mu A$	
Shutdown Output Current	$I_{OUT(SHDN)}$	(Note 5)		10	<b>20</b>	$\mu A$	

Note 2: For the details of  $V_{IN}$  range, please refer to  $(V_{IN}-V_{OUT}) * I_{LOAD} \leq$  maximum power dissipation (Figure 4).

Note 3: Dropout voltage is defined as the input-to-output differential when the output voltage drops to 99% of its nominal value which is measured at  $V_{OUT}+1V$  applied to  $V_{IN}$ .

Note 4:  $V_{IN}=V_{OUT(NOMINAL)}+1V$ .

Note 5:  $V_{EN} \leq 0.8V$ ,  $V_{IN} \leq 8V$ ,  $V_{OUT}=0V$ .



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**Typical Performance Characteristics**

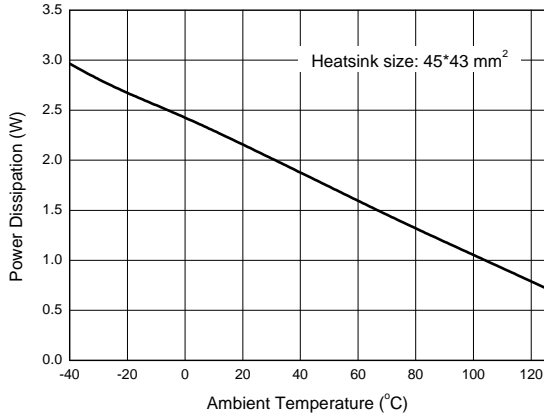


Figure 4. Power Dissipation vs. Ambient Temperature

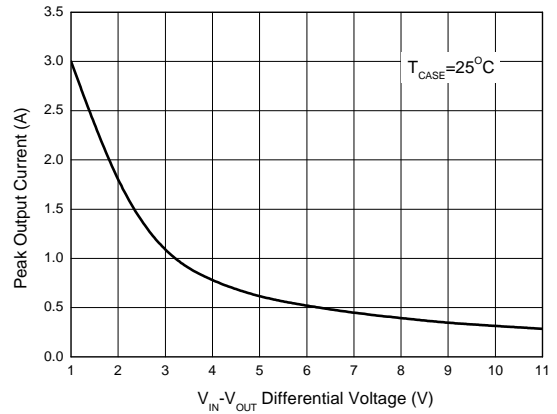


Figure 5. Peak Output Current vs.  $V_{IN}-V_{OUT}$  Differential Voltage

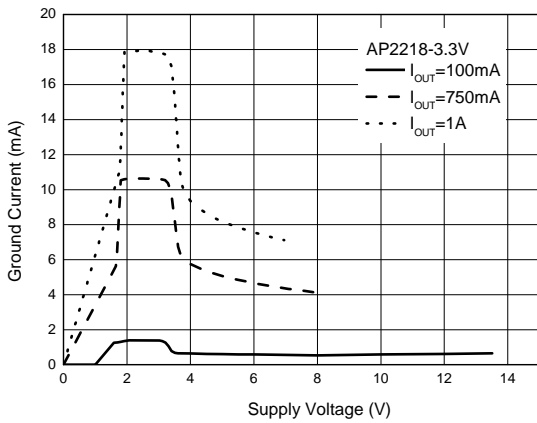


Figure 6. Ground Current vs. Supply Voltage

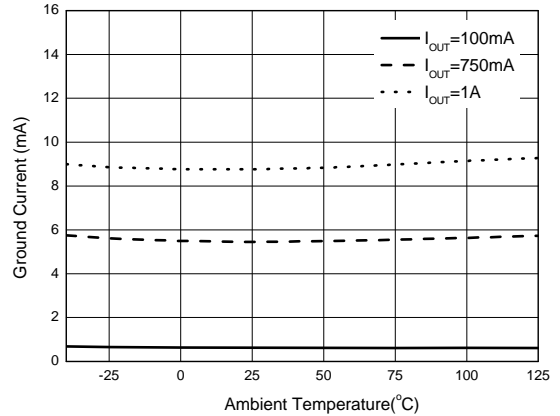


Figure 7. Ground Current vs. Ambient Temperature



**1A LOW DROPOUT LINEAR REGULATOR** **AP2218**

**Typical Performance Characteristics (Continued)**

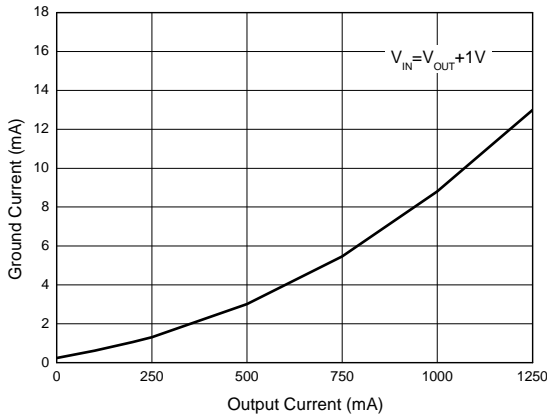


Figure 8. Ground Current vs. Output Current

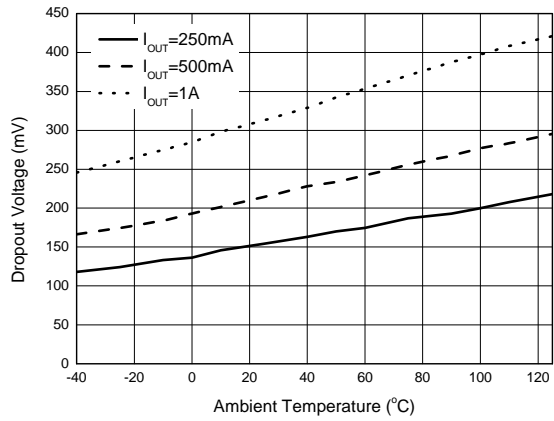


Figure 9. Dropout Voltage vs. Ambient Temperature

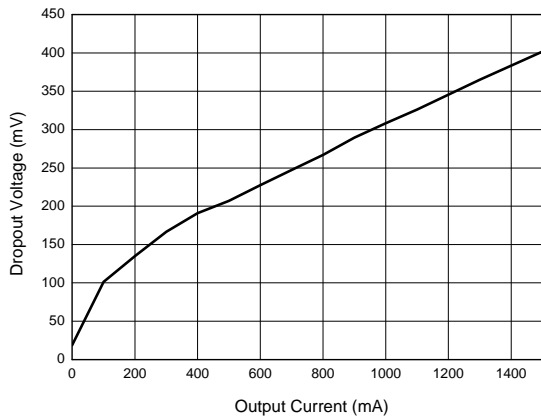


Figure 10. Dropout Voltage vs. Output Current

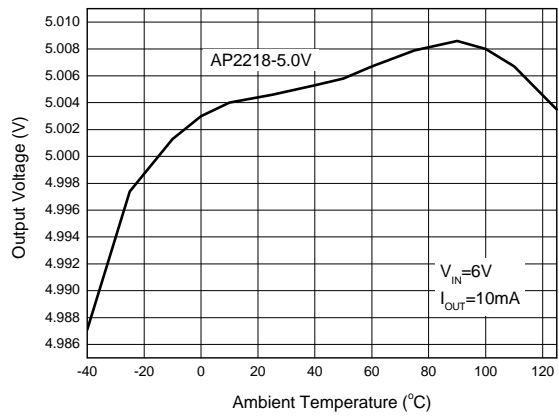


Figure 11. Output Voltage vs. Ambient Temperature





**1A LOW DROPOUT LINEAR REGULATOR** **AP2218**

**Typical Performance Characteristics (Continued)**

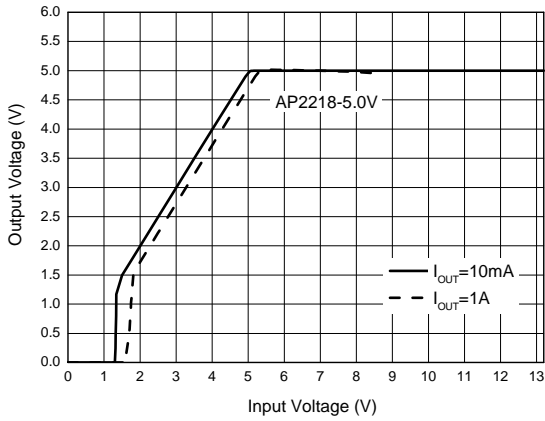


Figure 12. Dropout Characteristics

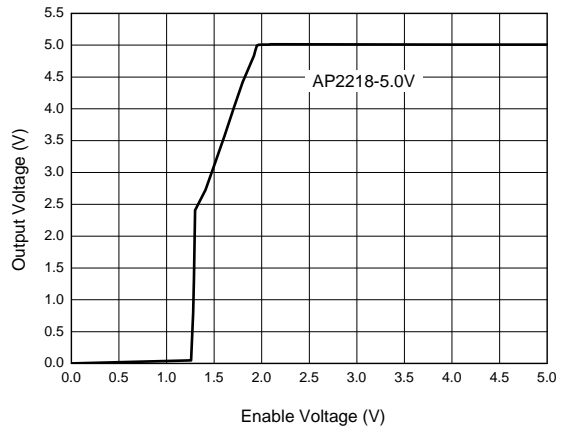


Figure 13. Output Voltage vs. Enable Voltage

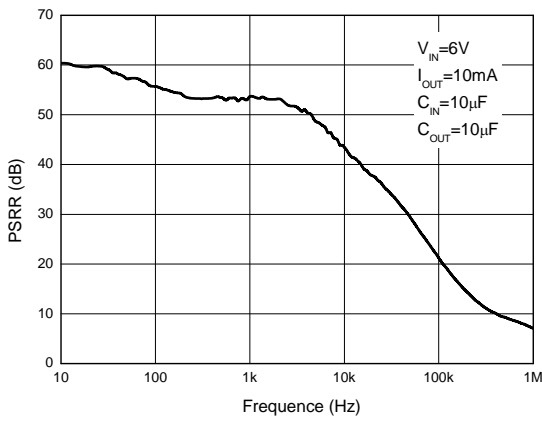


Figure 14. Power Supply Rejection Ratio

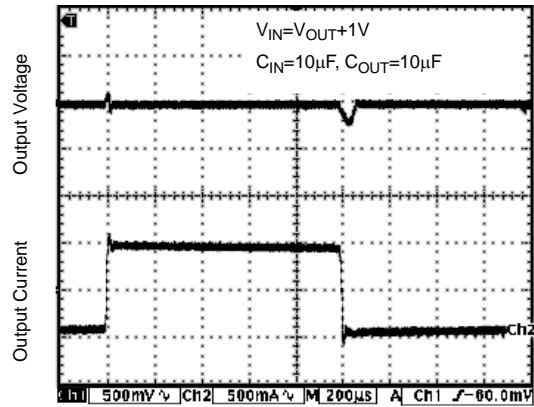


Figure 15. Load Transient



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**Typical Performance Characteristics (Continued)**

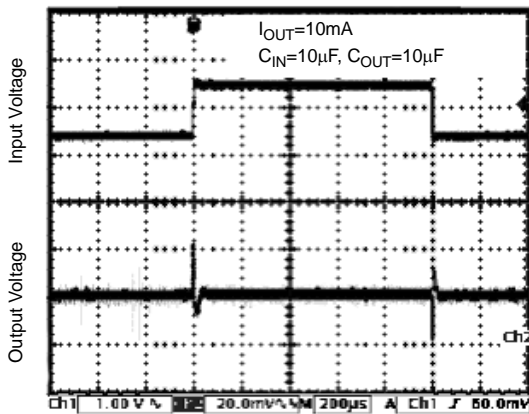


Figure 16. Line Transient



**1A LOW DROPOUT LINEAR REGULATOR** **AP2218**

**Typical Application**

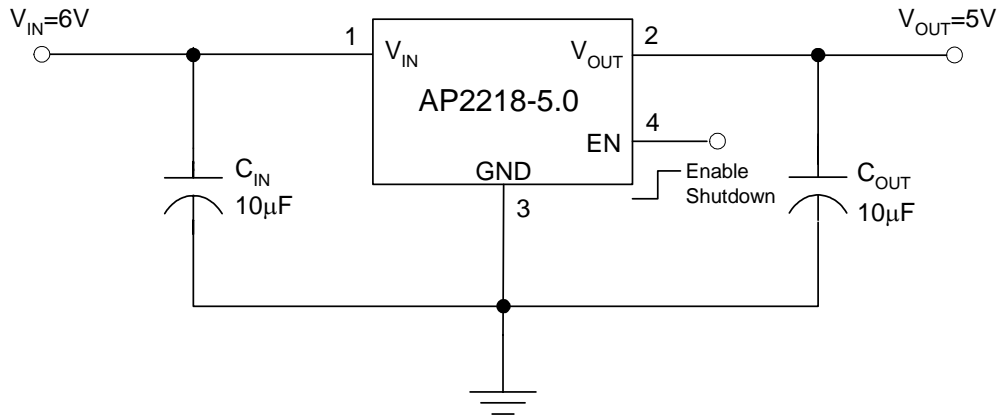


Figure 17. Typical Application of AP2218



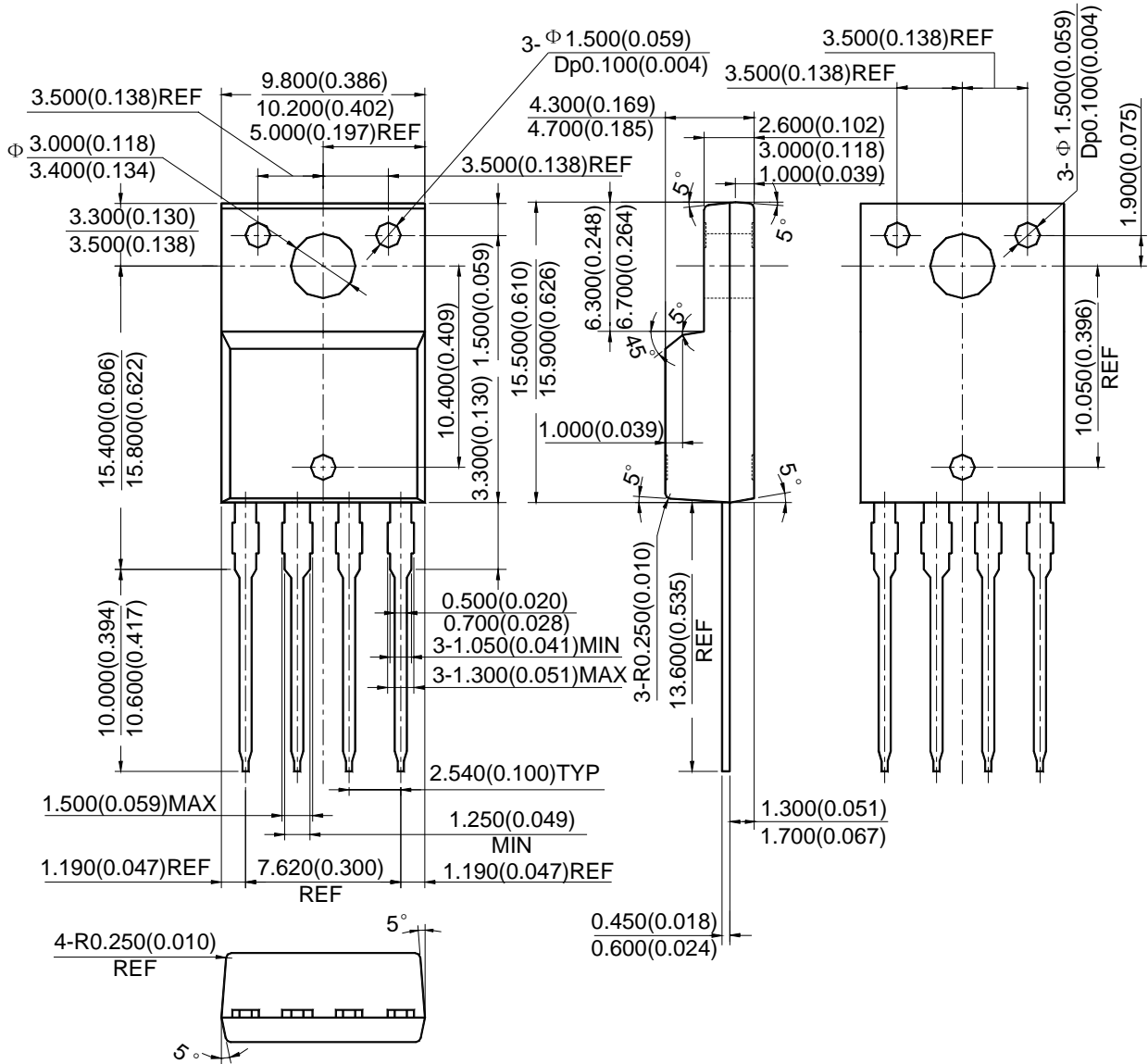
1A LOW DROPOUT LINEAR REGULATOR

AP2218

Mechanical Dimensions

TO-220F-4

Unit: mm(inch)





BCD Semiconductor Manufacturing Limited

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