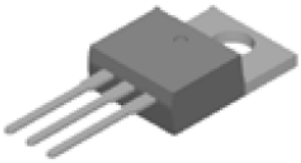
5A Low Dropout Linear Regulator

General Description

- The LD1084 is a series of low dropout positive voltage regulators with a maximum dropout of 1.5V at 5A of load current.
- The LD1084 series is available in 1.5V, 1.8V, 2.5V, 3.3V and 5.0V versions. The fixed versions integrate the adjust resistors. It is also available in an adjustable version which can set the output voltage with two external resistors.
- The LD1084 series includes a current limiting circuit and a trimmed band-gap reference. It also provides thermal limiting protection against excessive junction temperature.
- The LD1084 series is available in standard packages of DPAK (TO-252-2), D^2PAK-2(TO-263-2) and TO-220-3.

DPAK
(TO-252-2)

D^2PAK-2
(TO-263-2)



TO-220

Features

- Low dropout voltage: 1.3V typical at 5A
- Current limiting and thermal protection
- Output current: 5A
- Current limit: 6.5A
- Operation junction temperature: 0 to 125°C
- Line regulation(adj version): 0.015% typical
- Load regulation(adj version): 0.1% typical
- RoHS compliant and halogen free

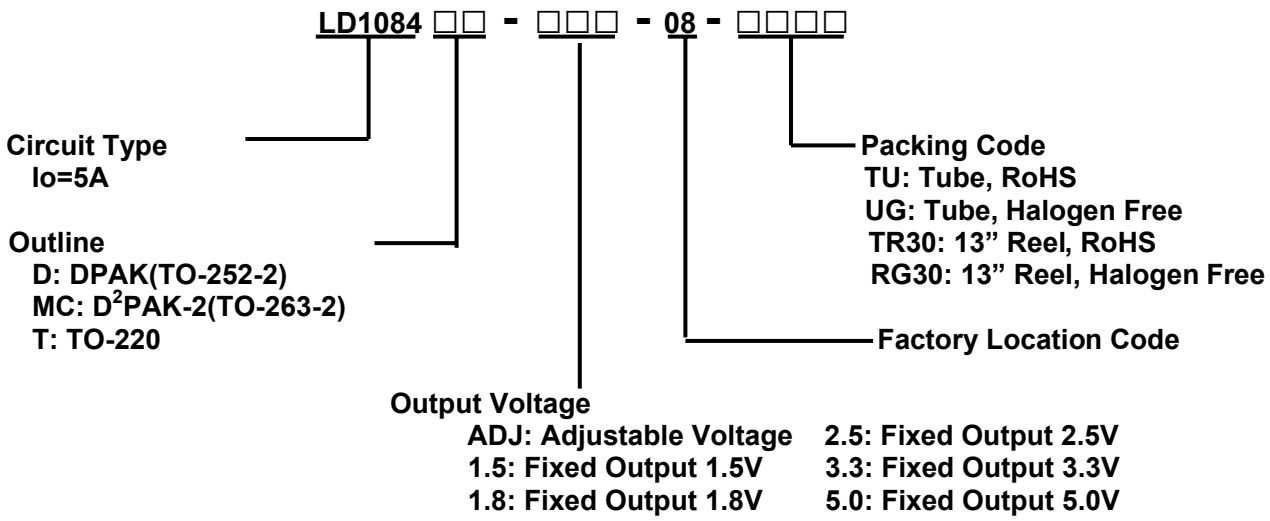
RoHS Compliant

HALOGEN FREE

Applications

- High Efficiency Linear Regulator
- Battery Chargers
- Post Regulation for Switching Supply
- Microprocessor Supply
- Desktop PCs, RISC and Embedded Processors' Supply

Ordering Information



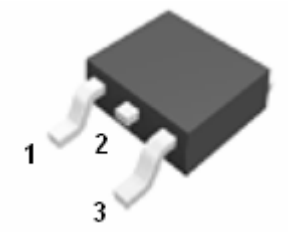
Marking Information

Outline	Temperature Range	PN	Marking Code	Packing Type
DPAK	0 to 125°C	LD1084D-xxx-08-TU	AZ1084D-xxxE1	Tube
		LD1084D-xxx-08-UG	AZ1084D-xxxG1	
		LD1084D-xxx-08-TR30	AZ1084D-xxxE1	Tape & Reel
		LD1084D-xxx-08-RG30	AZ1084D-xxxG1	
D^2PAK-2	0 to 125°C	LD1084MC-xxx-08-TU	AZ1084S2-xxxE1	Tube
		LD1084MC-xxx-08-UG	AZ1084S2-xxxG1	
		LD1084MC-xxx-08-TR30	AZ1084S2-xxxE1	Tape & Reel
		LD1084MC-xxx-08-RG30	AZ1084S2-xxxG1	
TO-220	0 to 125°C	LD1084T-xxx-08-TU	AZ1084T-xxxE1	Tube
		LD1084T-xxx-08-UG	AZ1084T-xxxG1	
		LD1084T-xxx-08-TR30	AZ1084T-xxxE1	Tape & Reel
		LD1084T-xxx-08-RG30	AZ1084T-xxxG1	

Note: 1. "xxx" means output voltage, e.g "1.5".

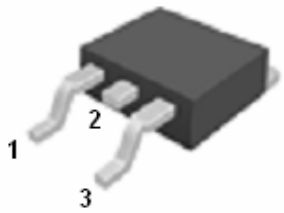
2. "E1" suffix means RoHS compliant in marking code, and "G1" means Green.

Pin Configuration



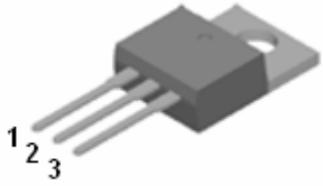
1: GND/ADJ 2: OUTPUT 3: INPUT

DPAK(TO-252-2)



1: GND/ADJ 2: OUTPUT 3: INPUT

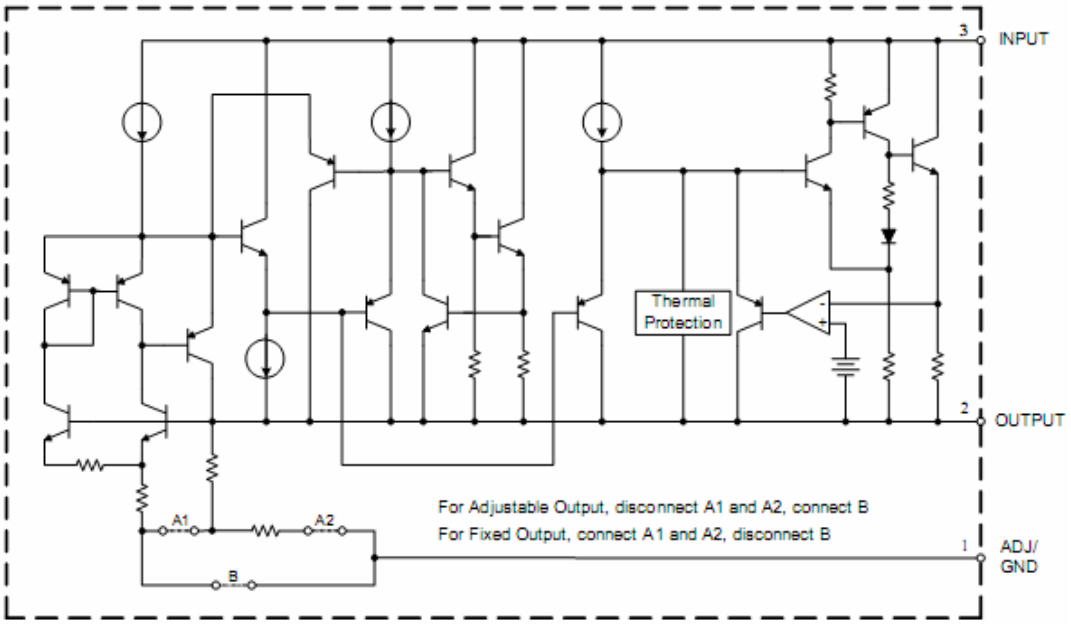
D^2PAK-2(TO-263-2)



1: GND/ADJ 2: OUTPUT 3: INPUT

TO-220

Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Description		Ratings	Unit
T_J	Operating Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-65 ~ +150	°C
T_{LEAD}	Lead Temperature (Soldering, 10 sec.)		260	°C
θ_{JA}	Junction-to-Ambient Thermal Resistance	DPAK(TO-252-2)	100	°C/W
		D^2PAK-2(TO-263-2)	60	
		TO-220	60	
θ_{JC}	Junction-to-Case Thermal Resistance	DPAK(TO-252-2)	7.36	°C/W
		D^2PAK-2(TO-263-2)	4.15	
		TO-220	4.15	
ESD	ESD (Human Body Model)		2000	V
	ESD (Machine Model)		400	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 “Recommended Operating Conditions” is not implied. Exposure to “Absolute Maximum Ratings” for extended period may affect device reliability.

2. Absolute maximum ratings indicate limits, beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings.

Recommended Operating Conditions

Symbol	Description	Min.	Max.	Unit
V_{IN}	Input Voltage	-	12	V
T_J	Operating Junction Temperature Range	0	125	°C

Electrical Characteristics

(Unless otherwise specified, T_J=25°C)

LD1084-ADJ

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{REF}	Reference Voltage	1.238	1.250	1.262	V	I_{OUT}=10mA, V_{IN}-V_{OUT}=3V
		1.225	1.250	1.270	V	10mA≤I_{OUT}≤5A,1.5V≤V_{IN}-V_{OUT}≤5V 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.015	0.2	%	I_{OUT}=10mA, 2.85V≤V_{IN}≤10V
		-	0.035	0.2	%	I_{OUT}=10mA, 2.85V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	0.1	0.3	%	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	0.2	0.4	%	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{REF} =1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_{LOAD}	Min. Load Current	-	3	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
I_{ADJ}	Adjust Pin Current	-	55	120	uA	I_{OUT}=10mA, V_{IN} =4.25V, 0°C≤T_J≤125°C
ΔI_{ADJ}	Adjust Pin Current Change	-	0.2	5	uA	10mA≤I_{OUT}≤5A,1.5V≤V_{IN}-V_{OUT}≤4.5V, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

LD1084-1.5

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{OUT}	Output Voltage	1.485	1.5	1.515	V	I_{OUT}=0mA, V_{IN}=4.5V
		1.47	1.5	1.53	V	10mA≤I_{OUT}≤5A, 3V≤V_{IN}-V_{OUT}≤6V, 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.5	6	mV	I_{OUT}=10mA, 3V≤V_{IN}≤10V
		-	1	6	mV	I_{OUT}=10mA, 3V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	3	15	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	7	20	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{OUT}=1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

LD1084-1.8

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{OUT}	Output Voltage	1.782	1.8	1.818	V	I_{OUT}=0mA, V_{IN}=4.8V
		1.764	1.8	1.836	V	10mA≤I_{OUT}≤5A, 3.3V≤V_{IN}-V_{OUT}≤6V, 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.5	6	mV	I_{OUT}=10mA, 3.3V≤V_{IN}≤10V
		-	1	6	mV	I_{OUT}=10mA, 3.3V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	3	15	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	7	20	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{OUT}=1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

LD1084-2.5

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{OUT}	Output Voltage	2.475	2.5	2.525	V	I_{OUT}=0mA, V_{IN}=5.5V
		2.45	2.5	2.55	V	10mA≤I_{OUT}≤5A, 4.0V≤V_{IN}-V_{OUT}≤7V, 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.5	6	mV	I_{OUT}=10mA, 4V≤V_{IN}≤10V
		-	1	6	mV	I_{OUT}=10mA, 4V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	3	15	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	7	20	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{OUT}=1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

LD1084-3.3

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{OUT}	Output Voltage	3.267	3.3	3.333	V	I_{OUT}=0mA, V_{IN}=6.3V
		3.234	3.3	3.366	V	10mA≤I_{OUT}≤5A, 4.8V≤V_{IN}-V_{OUT}≤8V, 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.5	6	mV	I_{OUT}=10mA, 4.8V≤V_{IN}≤10V
		-	1	6	mV	I_{OUT}=10mA, 4.8V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	3	15	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	7	20	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{OUT}=1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

LD1084-5.0

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
V_{OUT}	Output Voltage	4.95	5	5.05	V	I_{OUT}=0mA, V_{IN}=8V
		4.9	5	5.1	V	10mA≤I_{OUT}≤5A, 6.5V≤V_{IN}-V_{OUT}≤10V, 0°C≤T_J≤125°C
ΔV_{LINE}	Line Regulation	-	0.5	10	mV	I_{OUT}=10mA, 6.5V≤V_{IN}≤10V
		-	1	10	mV	I_{OUT}=10mA, 6.5V≤V_{IN}≤10V, 0°C≤T_J≤125°C
ΔV_{LOAD}	Load Regulation	-	5	20	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V
		-	10	35	mV	0mA≤I_{OUT}≤5A, V_{IN}-V_{OUT}=3V, 0°C≤T_J≤125°C
V_D	Dropout Voltage	-	1.3	1.5	V	I_{OUT}=5A, ΔV_{OUT}=1%, 0°C≤T_J≤125°C
I_{LIMIT}	Current Limit	5.5	6.5	-	A	V_{IN}-V_{OUT}=3V
I_Q	Quiescent Current	-	5	10	mA	V_{IN} =10V, 0°C≤T_J≤125°C
ΔeN	RMS Noise(ΔV_{OUT})	-	0.003	-	%	10Hz≤f≤100KHz
RR	Ripple Rejection	60	72	-	dB	I_{OUT}=5A, C_{OUT}=25uF(Tantalum) V_{IN}-V_{OUT}=3V, f=120Hz, 0°C≤T_J≤125°C
	Temperature Stability	-	0.5	-	%	I_{OUT}=10mA, V_{IN}-V_{OUT}=1.5V, 0°C≤T_J≤125°C
	Long-Term Stability	-	0.5	-	%	T_A=125°C, 1000hours

Typical Characteristics Curves

Fig.1- Dropout Voltage vs. Output Current

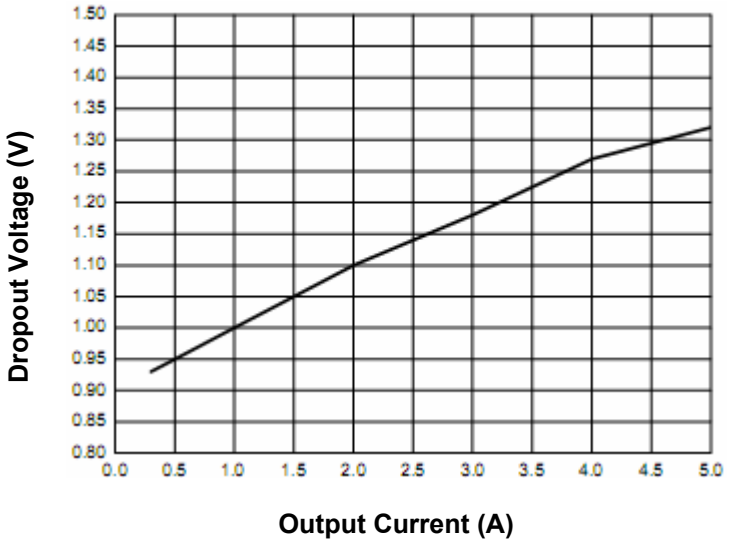


Fig.2- Output Voltage vs. Junction Temperature

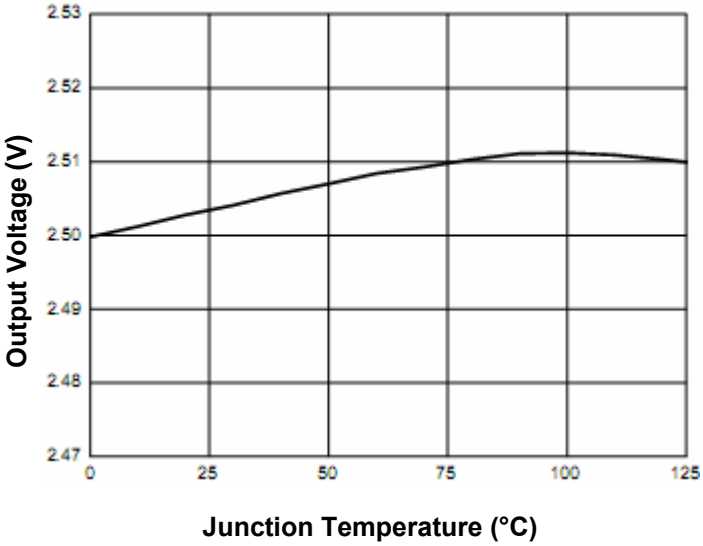


Fig.3- Reference Voltage vs. Junction Temperature

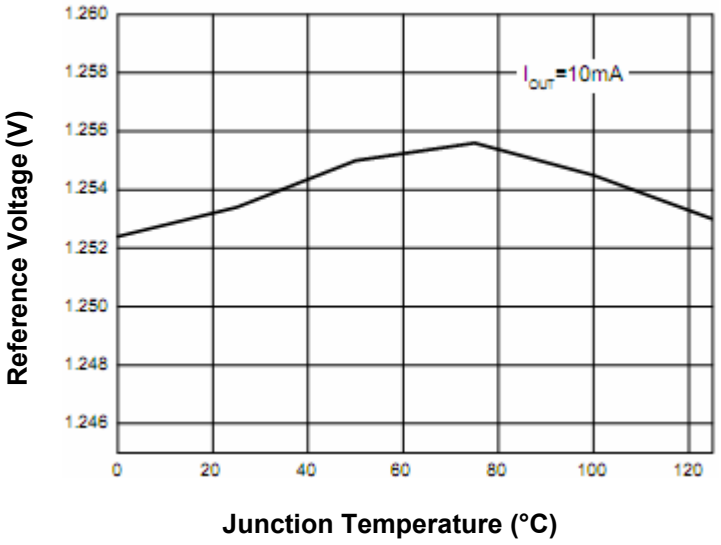


Fig.4- Min. Load Current vs. Junction Temperature

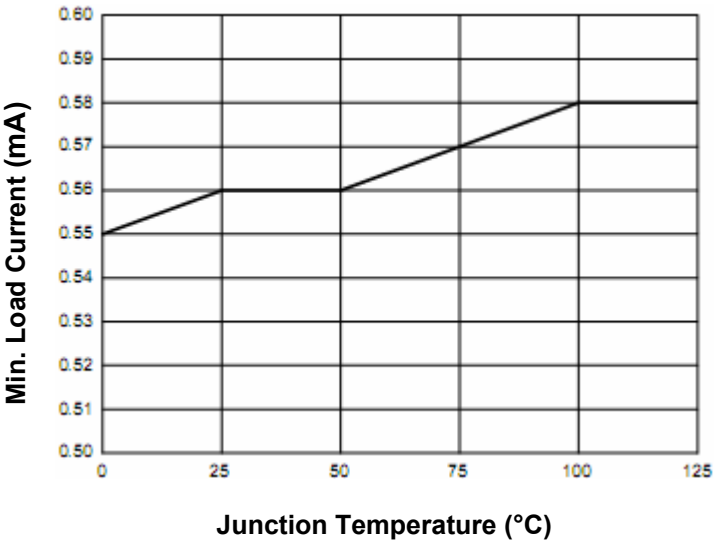


Fig.5- Adjust Pin Current vs. Junction Temperature

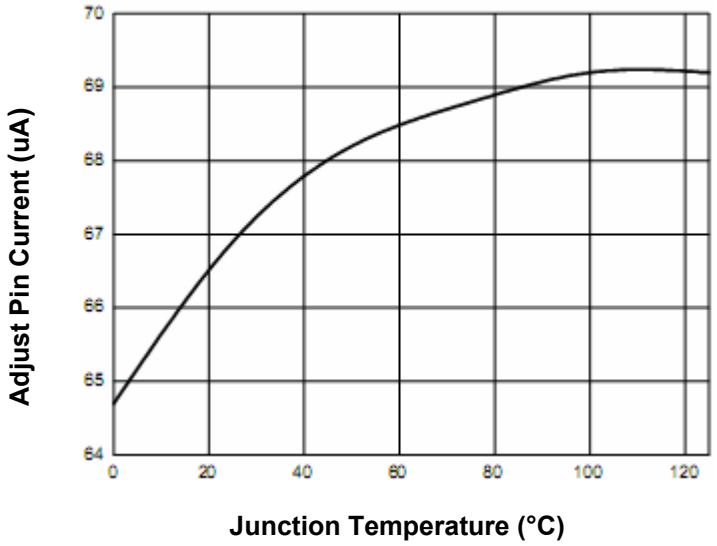


Fig.6- Power Dissipation vs. Case Temperature

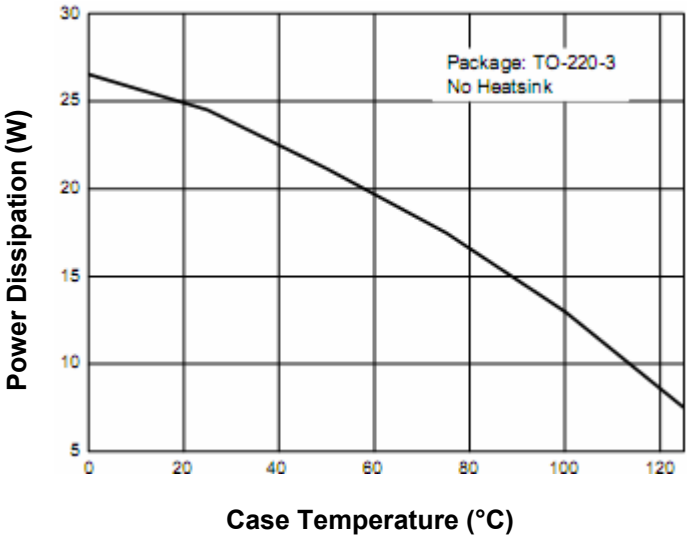


Fig.7- Line Regulation vs. Junction Temperature

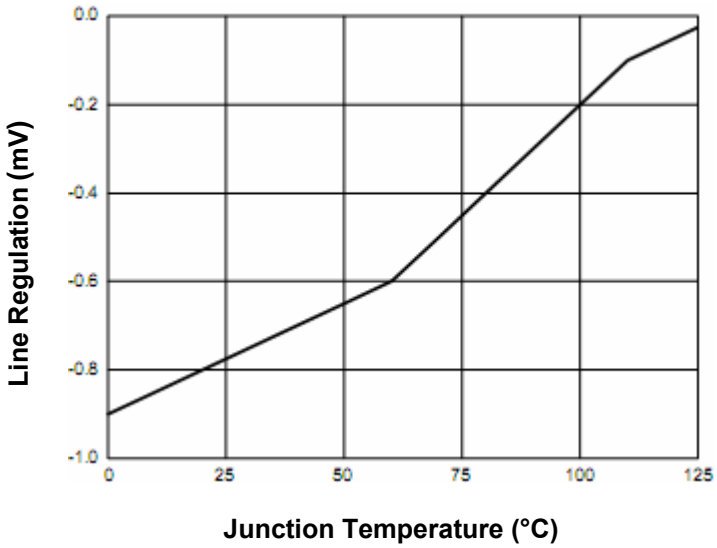


Fig.8- Adjust Pin Current vs. Output Current

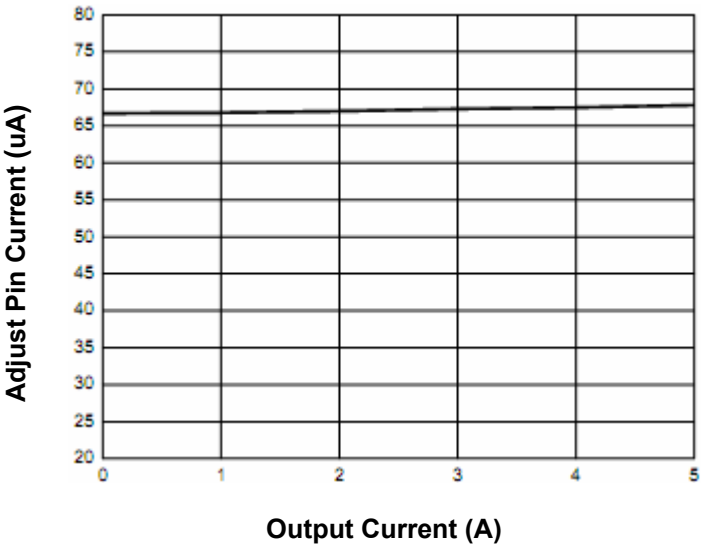


Fig.9- Dropout Voltage vs. Junction Temperature

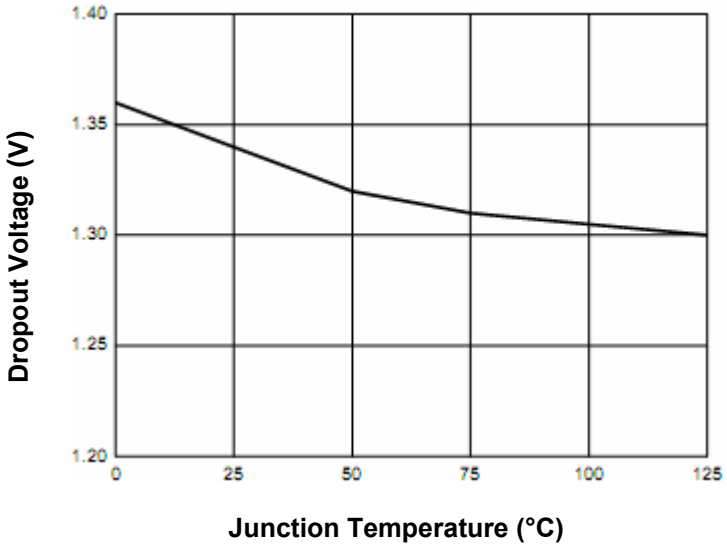


Fig.10- Short Circuit Current vs. Dropout Voltage

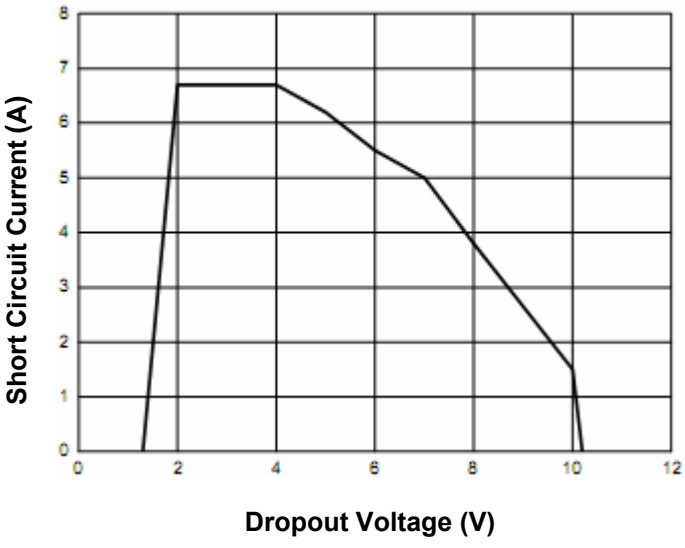
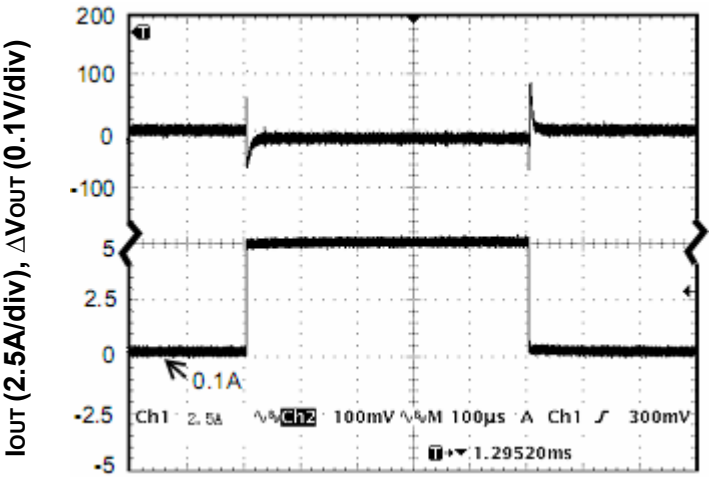
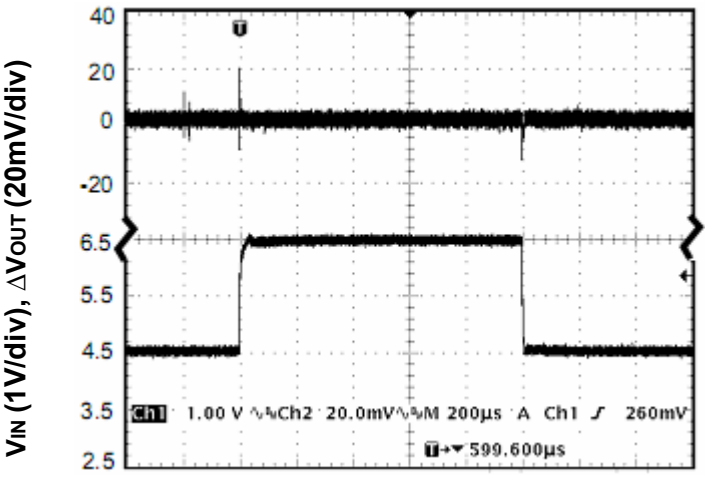


Fig.11- Load Transient Response



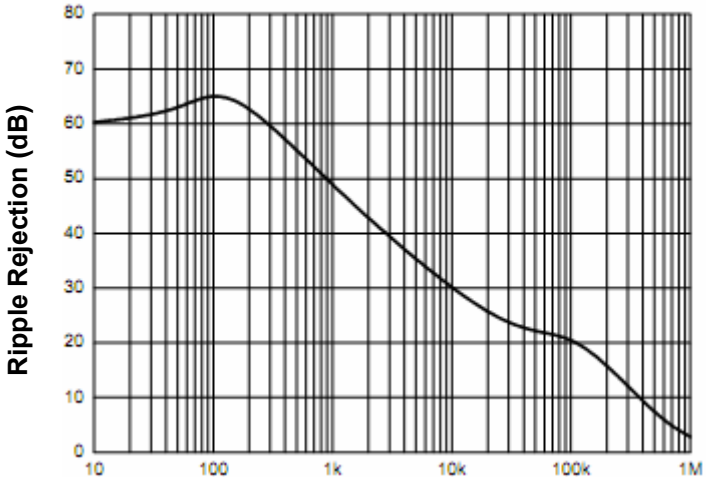
Conditions: V_{IN}=5.5V, V_{OUT}=2.5V,
I_{OUT}=10mA to 5A,
C_{IN}=10uF, C_{OUT}=10uF

Fig.12- Line Transient Response

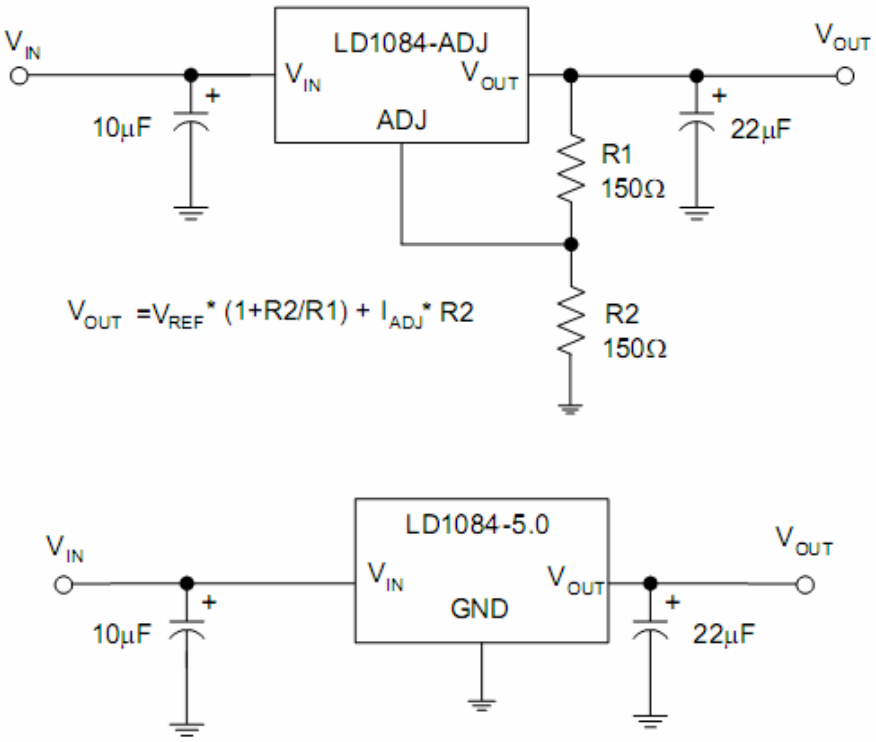


Conditions: V_{IN}=4.5V to 6.5V, V_{OUT}=2.5V,
I_{OUT}=200mA, C_{OUT}=10uF

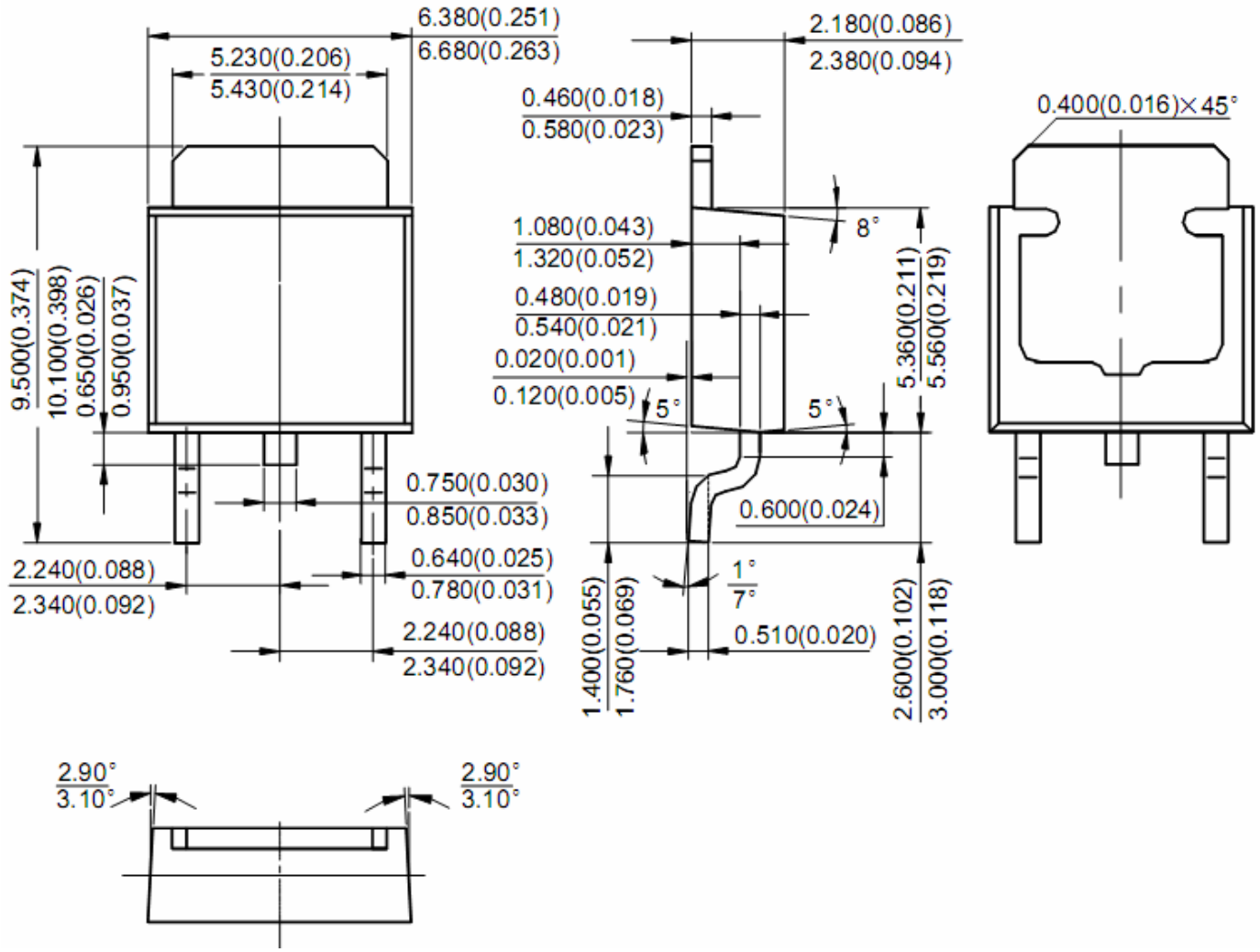
Fig.13- Ripple Rejection vs. Frequency



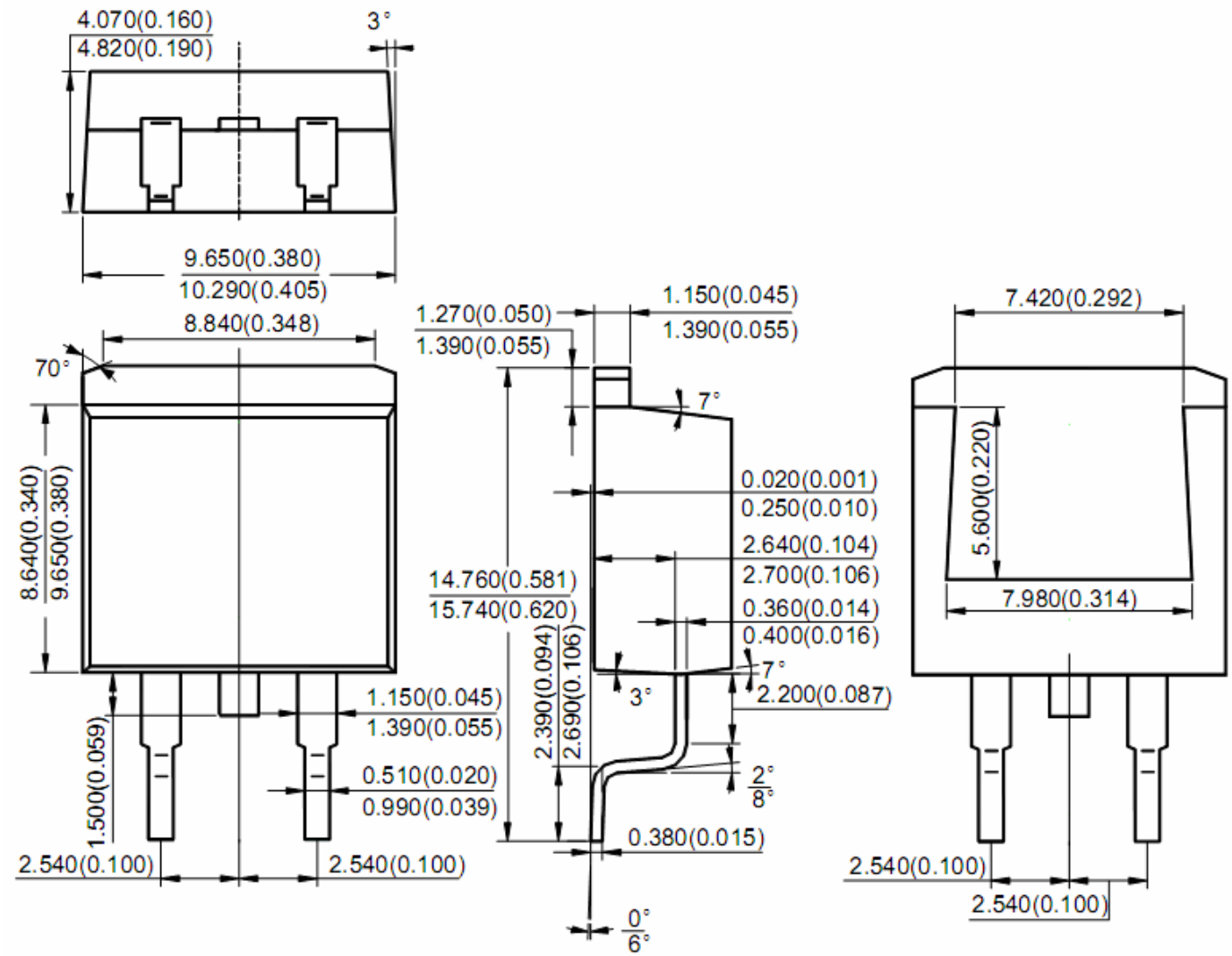
Typical Applications



Dimensions in mm(inch)



DPAK(TO-252-2)



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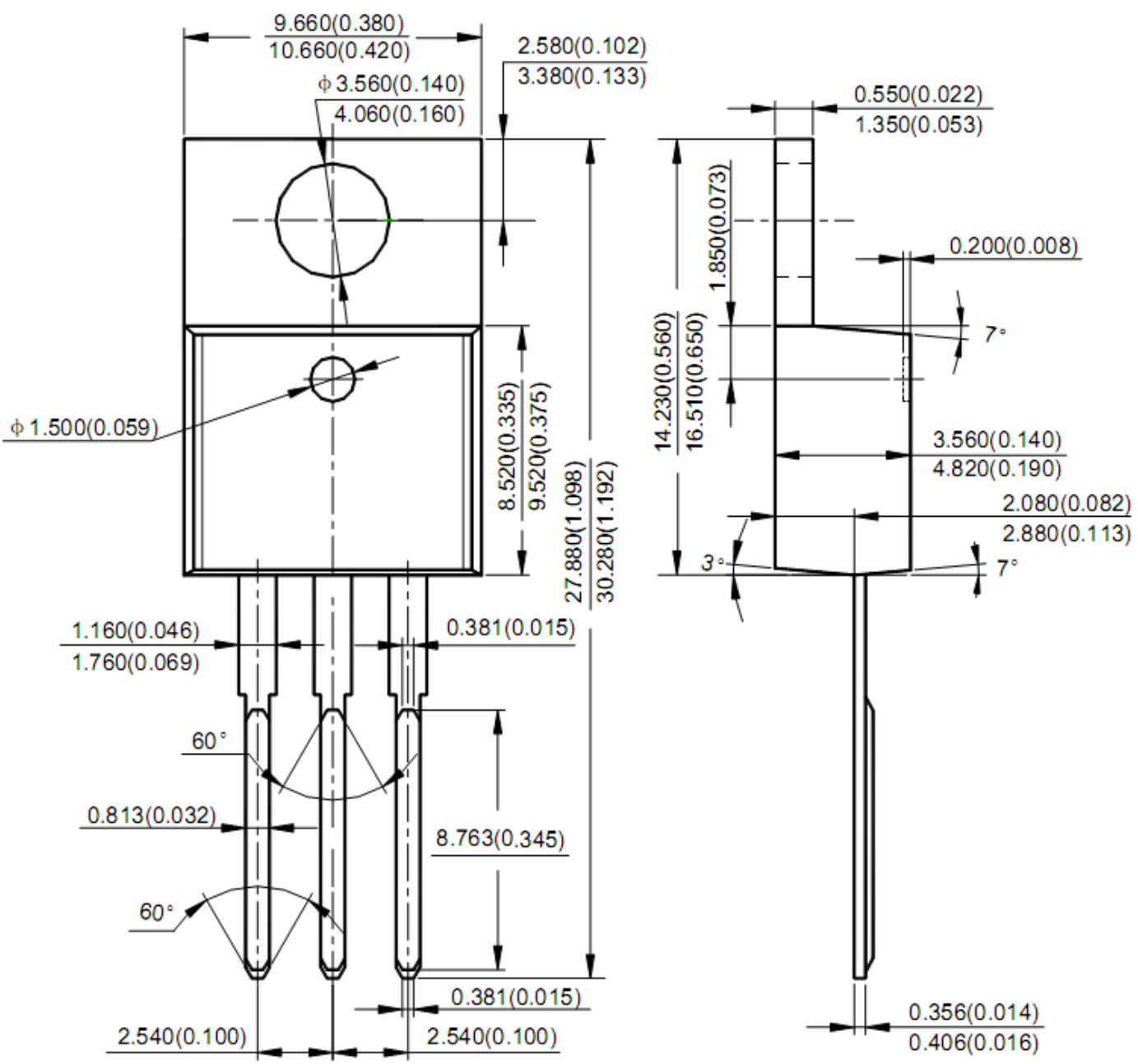
9.660(0.380)
10.660(0.420)
2.580(0.102)
3.380(0.133)
ϕ3.560(0.140)
4.060(0.160)
ϕ1.500(0.059)
8.520(0.335)
9.520(0.375)
27.880(1.098)
30.280(1.192)
1.160(0.046)
1.760(0.069)
0.381(0.015)
60°
0.813(0.032)
8.763(0.345)
60°
0.381(0.015)
2.540(0.100)
2.540(0.100)
0.550(0.022)
1.350(0.053)
1.850(0.073)
0.200(0.008)
7°
14.230(0.560)
16.510(0.650)
3.560(0.140)
4.820(0.190)
2.080(0.082)
2.880(0.113)
3°
7°
0.356(0.014)
0.406(0.016)

TO-220

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