优尚

YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

0755-83047638
ysbdt@szyoushang.cn
www.szyoushang.cn

企业微信二维码

企业QQ二维码

Description

The DIODES™ NK-AS78XXA series are three-terminal positive voltage regulators designed for a wide variety of applications including local, on-card regulation.

The NK-AS78XXA are complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking is provided, these regulators can deliver output currents of up to 1A.
The NK-AS78XXA are available in TO-252-2 (3), TO-252-2 (4), TO-252-2 (5), TO-220-3, TO-220-3 (2), and TO-220F-3 packages.

Applications

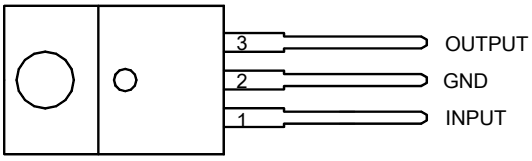
- High-efficiency linear regulators
- Post regulation for switching supplies
- Microprocessor power supplies
- Motherboards

Features

- Output Current up to 1A
- Fixed Output Voltages of 5V, 6V, 8V, 9V, 12V, 15V, and 18V
- Output Voltage Accuracy of ±4% over the Full Temperature Range
- Internal Short-Circuit Current Limiting
- Internal Thermal Overload Protection
- Output Transistor Safe-area Protection
- Low Load Regulation
- Stable Performance in High Temperature
- TO-220-3, TO-220-3 (2) and TO-220F-3
  - **Lead-Free Finish; RoHS Compliant (Notes 1 & 3)**
- Lead-Free Packages: TO-252-2 (3), TO-252-2 (4), TO-252-2 (5)
  - **Totally Lead-Free; RoHS Compliant (Notes 2 & 3)**
- Available in “Green” Packages: TO-220-3, TO-220-3 (2) and TO-220F-3
  - **Lead-Free Finish; RoHS Compliant (Notes 1 & 3)**
  - **Halogen and Antimony Free. “Green” Device (Note 4)**
- Lead-Free Packages, Available in “Green” Molding Compound: TO-252-2 (3), TO-252-2 (4), TO-252-2 (5)
  - **Totally Lead-Free & Fully RoHS Compliant (Notes 2 & 3)**
  - **Halogen and Antimony Free. “Green” Device (Note 4)**

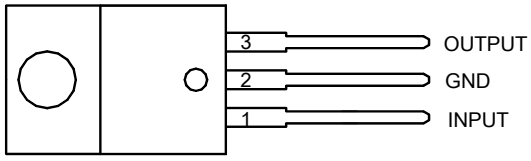
Pin Assignments

(Front View)



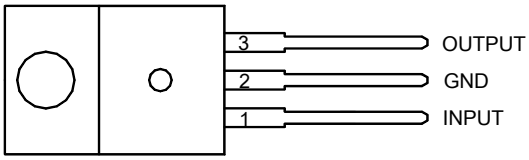
TO-220-3 (Option 1)

(Front View)



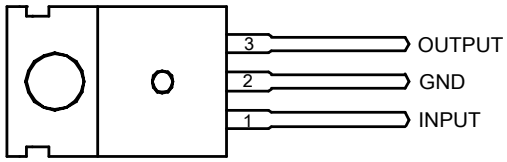
TO-220-3 (Option 2)

(Front View)



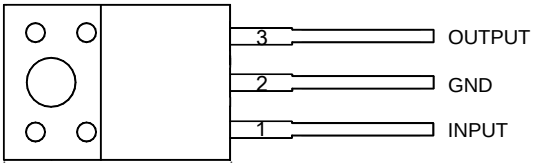
TO-220-3 (Option 3)

(Front View)



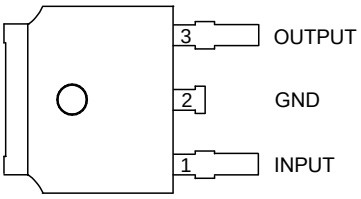
TO-220-3 (2)

(Front View)



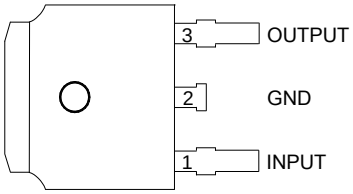
TO-220F-3

(Top View)



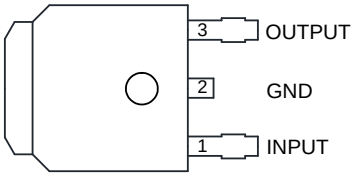
TO-252-2 (3) (Option 1)

(Top View)



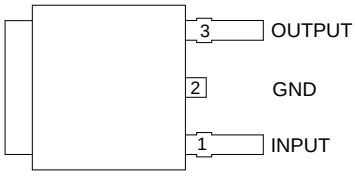
TO-252-2 (3) (Option 2) / TO252 (Type CJ)

(Top View)



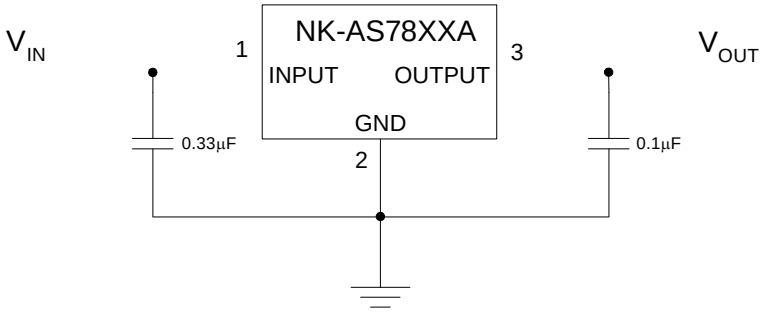
TO-252-2 (4)

(Top View)



TO-252-2 (5)

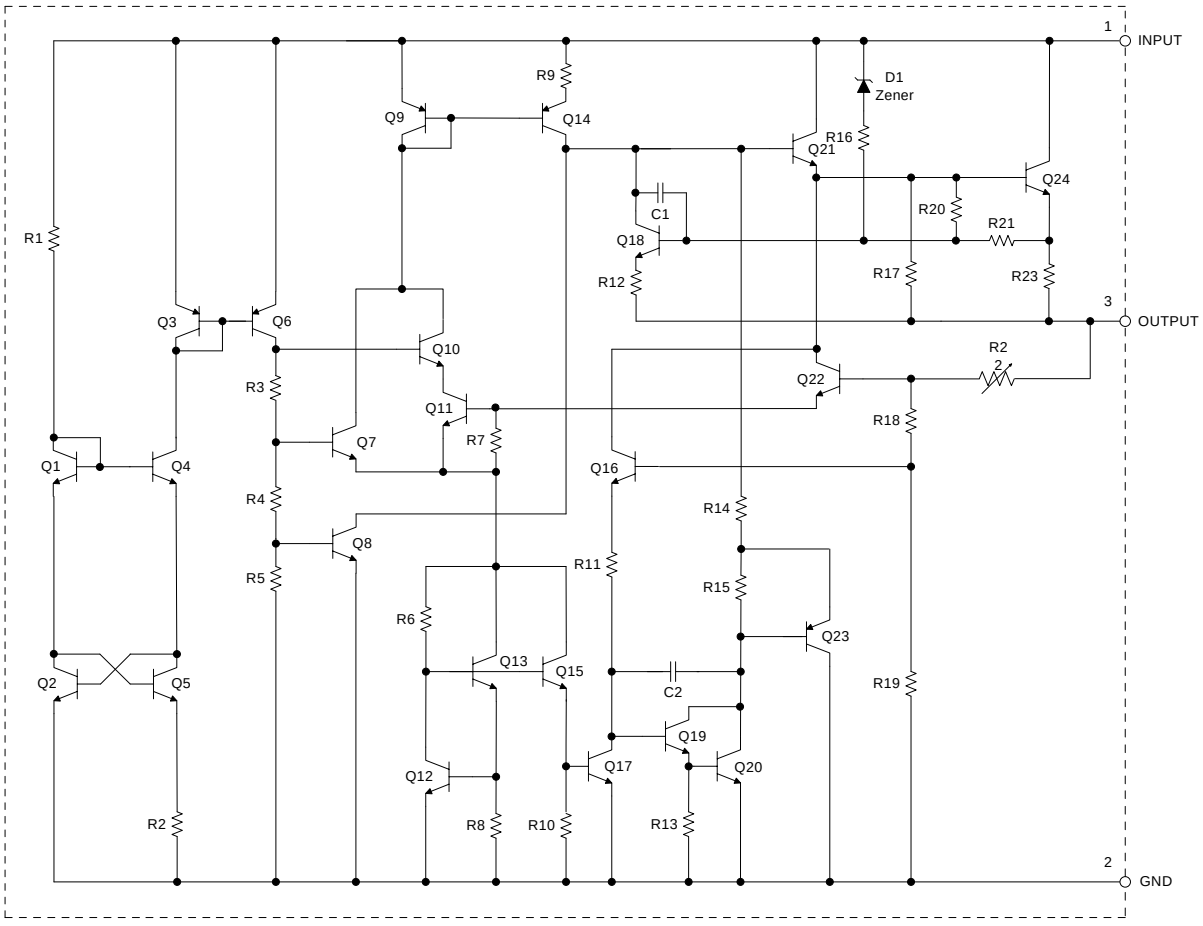
Typical Applications Circuit



Pin Descriptions

Pin Number	Pin Name	Function
1	INPUT	Voltage Input
2	GND	Ground
3	OUTPUT	Voltage Output

Functional Block Diagram



Absolute Maximum Ratings (Note 5)

Symbol	Parameter	Rating		Unit
V_{IN}	Input Voltage	36		V
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
P_D	Power Dissipation	Internally Limited		W
T_J	Operating Junction Temperature	+150		°C
T_{STG}	Storage Temperature Range	-65 to +150		°C
θ_{JA}	Thermal Resistance	TO-220-3/TO-220-3 (2)	60	°C/W
		TO-252-2 (3)/TO-252-2 (4)/TO-252-2 (5)	100	
		TO-220F-3	60	
ESD	ESD (Human Body Model)	6000		V
ESD	ESD (Machine Model)	500		V

Note: 5. 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

Symbol	Parameter		Min	Max	Unit
V_{IN}	Input Voltage	NK-AS7805A	—	25	V
		NK-AS7806A	—	26	
		NK-AS7808A	—	28	
		NK-AS7809A	—	29	
		NK-AS7812A	—	32	
		NK-AS7815A	—	32	
		NK-AS7818A	—	32	
T_J	Operating Junction Temperature Range		-40	+125	°C

Electrical Characteristics

NK-AS7805A (@ V_{IN} = 10V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	4.9	5	5.1	V
		I_{OUT} = 5mA to 1A, V_{IN} = 7.5V to 20V, $P_D \leq$ 15W	4.8	—	5.2	
V_{RLINE}	Line Regulation	V_{IN} = 7.5V to 20V, I_{OUT} = 500mA, T_J = +25°C	—	25	50	mV
V_{RLOAD}	Load Regulation	V_{IN} = 10V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	20	50	mV
I_Q	Quiescent Current	V_{IN} = 10V, I_{OUT} = 0	—	3.2	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 8V to 25V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 8V to 18V, f = 120Hz, I_{OUT} = 500mA	—	70	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	10	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.05	—	A
I_{PK}	Peak Output Current	V_{IN} = 10V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.4	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Electrical Characteristics (continued)

NK-AS7806A (@ V_{IN} = 11V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	5.88	6	6.12	V
		I_{OUT} = 5mA to 1A, V_{IN} = 8.6V to 21V, $P_D \leq$ 15W	5.76	—	6.24	
V_{RLINE}	Line Regulation	V_{IN} = 8.6V to 21V, I_{OUT} = 500mA, T_J = +25°C	—	25	60	mV
V_{RLOAD}	Load Regulation	V_{IN} = 11V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	20	60	mV
I_Q	Quiescent Current	V_{IN} = 11V, I_{OUT} = 0	—	3.2	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 8.6V to 21V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 9.5V to 19.5V, f = 120Hz, I_{OUT} = 500mA	—	65	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = 25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	10	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 11V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.5	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Electrical Characteristics (continued)

NK-AS7808A (@ V_{IN} = 14V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	7.84	8	8.16	V
		I_{OUT} = 5mA to 1A, V_{IN} = 10.6V to 23V, $P_D \leq$ 15W	7.7	—	8.3	
V_{RLINE}	Line Regulation	V_{IN} = 10.6V to 23V, I_{OUT} = 500mA, T_J = +25°C	—	25	75	mV
V_{RLOAD}	Load Regulation	V_{IN} = 14V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	25	75	mV
I_Q	Quiescent Current	V_{IN} = 14V, I_{OUT} = 0	—	3.2	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 10.6V to 23V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 11.5V to 21.5V, f = 120Hz, I_{OUT} = 500mA	—	62	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	10	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 14V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.64	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Electrical Characteristics (continued)

NK-AS7809A (@ V_{IN} = 15V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	8.82	9	9.18	V
		I_{OUT} = 5mA to 1A, V_{IN} = 11.5V to 23V, $P_D \leq$ 15W	8.65	—	9.35	
V_{RLINE}	Line Regulation	V_{IN} = 11.5V to 23V, I_{OUT} = 500mA, T_J = +25°C	—	25	90	mV
V_{RLOAD}	Load Regulation	V_{IN} = 14V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	25	100	mV
I_Q	Quiescent Current	V_{IN} = 15V, I_{OUT} = 0	—	3.2	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 11.5V to 23V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 11.5V to 21.5V, f = 120Hz, I_{OUT} = 500mA	—	61	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	10	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 15V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.72	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Electrical Characteristics (continued)

NK-AS7812A (@ V_{IN} = 19V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	11.75	12	12.25	V
		I_{OUT} = 5mA to 1A, V_{IN} = 14.8V to 27V, $P_D \leq$ 15W	11.5	—	12.5	
V_{RLINE}	Line Regulation	V_{IN} = 14.8V to 27V, I_{OUT} = 500mA, T_J = +25°C	—	25	120	mV
V_{RLOAD}	Load Regulation	V_{IN} = 19V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	40	120	mV
I_Q	Quiescent Current	V_{IN} = 19V, I_{OUT} = 0	—	3.4	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 14.8V to 30V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 15V to 25V, f = 120Hz, I_{OUT} = 500mA	—	60	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	11	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 18V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	0.96	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Electrical Characteristics (continued)

NK-AS7815A (@ V_{IN} = 23V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	14.7	15	15.3	V
		I_{OUT} = 5mA to 1A, V_{IN} = 17.9V to 30V, $P_D \leq$ 15W	14.4	—	15.6	
V_{RLINE}	Line Regulation	V_{IN} = 17.9V to 30V, I_{OUT} = 500mA, T_J = +25°C	—	35	150	mV
V_{RLOAD}	Load Regulation	V_{IN} = 23V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	70	150	mV
I_Q	Quiescent Current	V_{IN} = 23V, I_{OUT} = 0	—	3.4	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 17.9V to 30V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 18.5V to 28.5V, f = 120Hz, I_{OUT} = 500mA	—	58	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	11	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 21V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	1.2	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

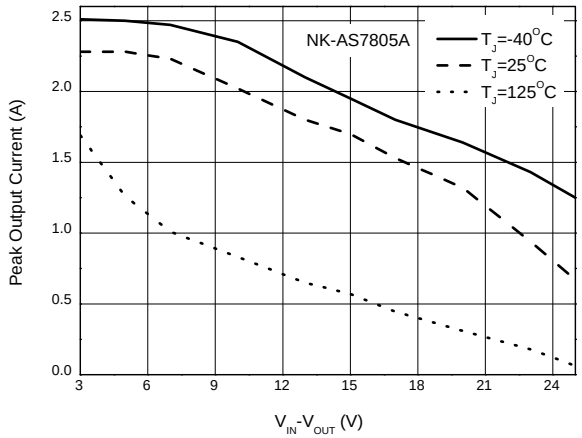
Electrical Characteristics (continued)

NK-AS7818A (@ V_{IN} = 27V, I_{OUT} = 1A, T_J = -40 to +125°C, unless otherwise specified.)

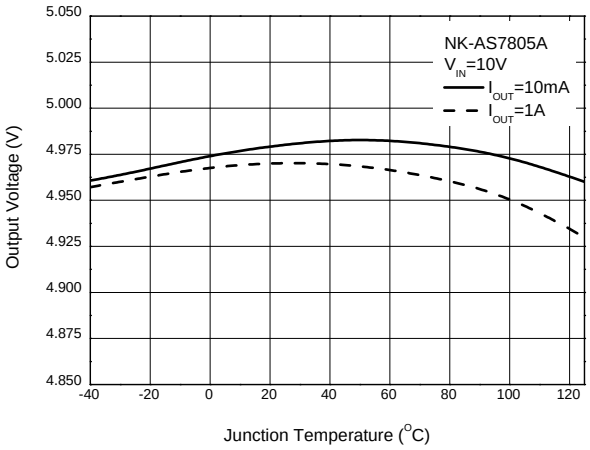
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	T_J = +25°C	17.64	18	18.36	V
		I_{OUT} = 5mA to 1A, V_{IN} = 21V to 33V, $P_D \leq$ 15W	17.3	—	18.7	
V_{RLINE}	Line Regulation	V_{IN} = 21V to 33V, I_{OUT} = 500mA, T_J = +25°C	—	45	180	mV
V_{RLOAD}	Load Regulation	V_{IN} = 27V, I_{OUT} = 5mA to 1A, T_J = +25°C	—	85	180	mV
I_Q	Quiescent Current	V_{IN} = 27V, I_{OUT} = 0	—	3.6	6	mA
ΔI_Q	Quiescent Current Change	V_{IN} = 21V to 33V, I_{OUT} = 500mA, T_J = +25°C	—	0.3	0.8	mA
		I_{OUT} = 5mA to 1A, T_J = +25°C	—	0.08	0.5	
PSRR	Ripple Rejection	V_{IN} = 22V to 32V, f = 120Hz, I_{OUT} = 500mA	—	57	—	dB
V_{DROP}	Dropout Voltage	ΔV_{OUT} = 1%, I_{OUT} = 1A, T_J = +25°C	—	2	—	V
N_O	Output Noise Voltage	f = 10Hz to 100kHz, T_A = +25°C	—	10	—	μV/V_O
R_O	Output Resistance	f = 1kHz	—	11	—	mΩ
I_{SC}	Short Circuit Current	V_{IN} = 35V, T_A = +25°C	—	0.2	—	A
I_{PK}	Peak Output Current	V_{IN} = 24V, T_J = +25°C	—	2.2	—	A
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	—	—	1.44	—	mV/°C
$(\Delta V_{OUT}/V_{OUT})/\Delta T$		—	—	80	—	ppm/°C
θ_{JC}	Thermal Resistance	TO-220-3/TO-220-3 (2)	—	9	—	°C/W
		TO-252-2 (3)/ TO-252-2 (4)/ TO-252-2 (5)/ TO252 (Type CJ)	—	16	—	
		TO-220F-3	—	9	—	

Performance Characteristics

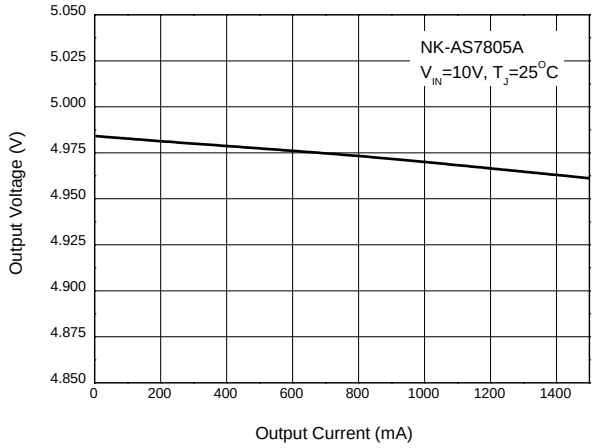
Peak Output Current vs. Input/Output Differential Voltage



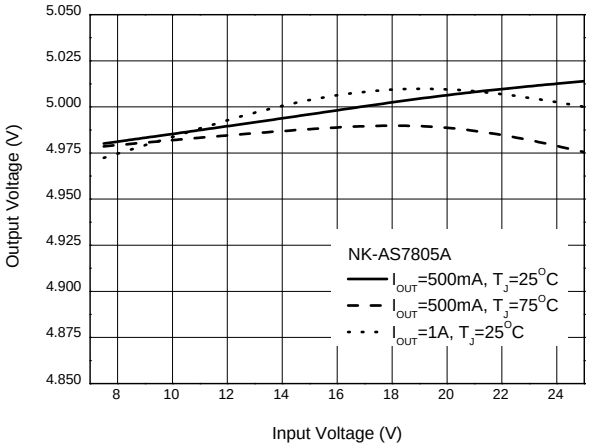
Output Voltage vs. Junction Temperature



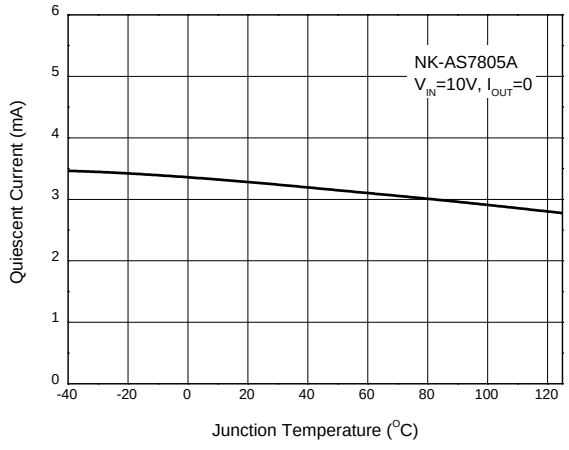
Output Voltage vs. Output Current



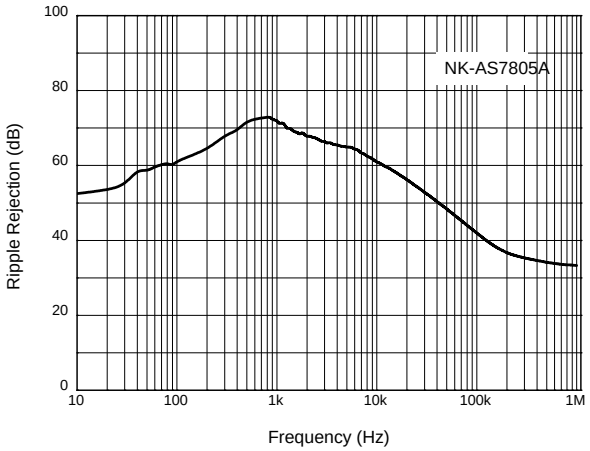
Output Voltage vs. Input Voltage



Quiescent Current vs. Junction Temperature

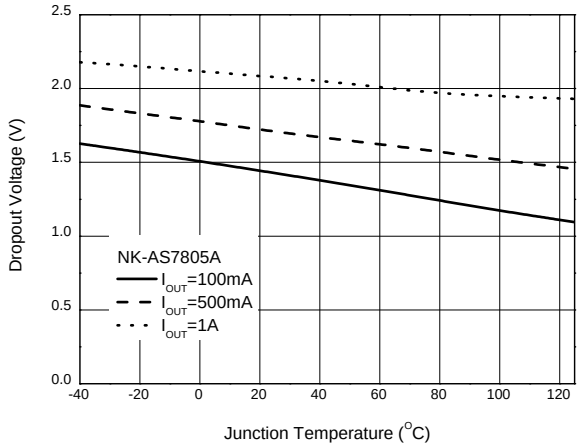


Ripple Rejection vs. Frequency

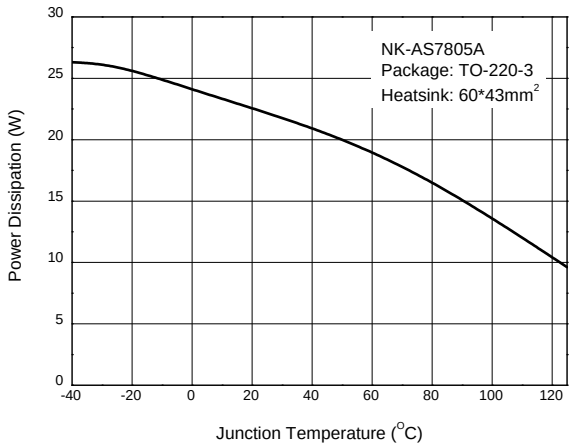


Performance Characteristics (continued)

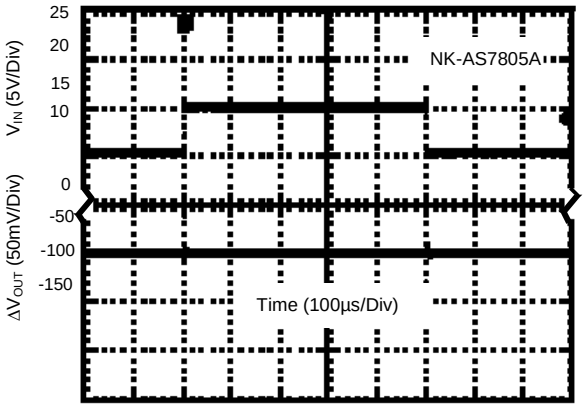
Dropout Voltage vs. Junction Temperature



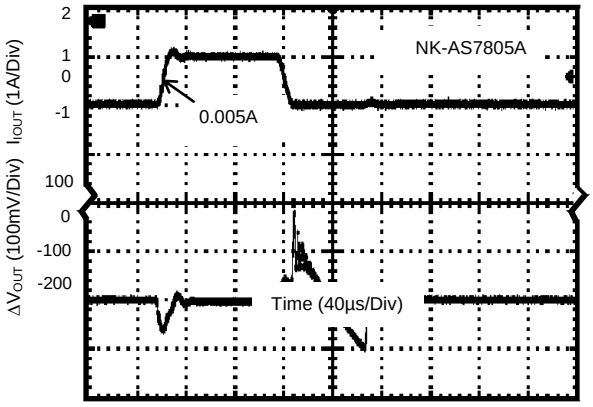
Power Dissipation vs. Junction Temperature



Line Transient
(Conditions: I_{OUT} = 500mA, C_{OUT} = 0.1μF)

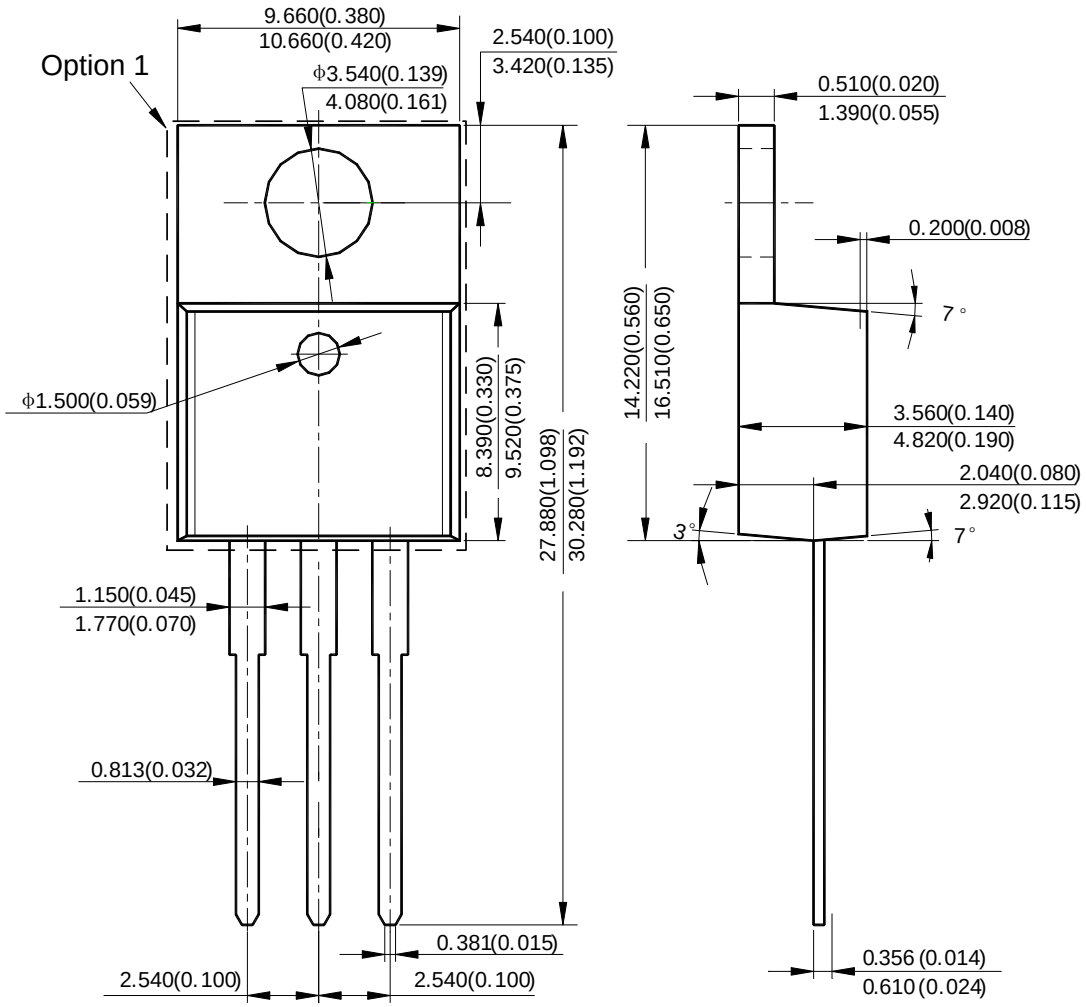


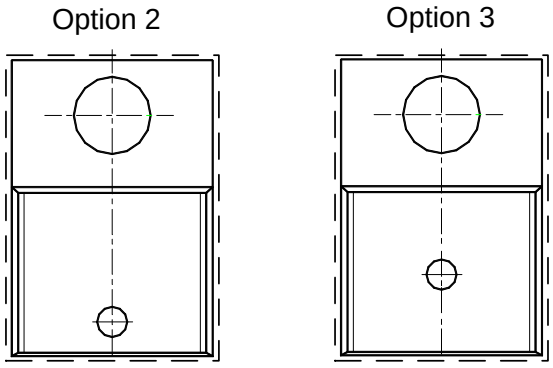
Load Transient
(Conditions: V_{IN} = 10V, C_{IN} = 0.33μF, C_{OUT} = 0.1μF)



Package Outline Dimensions (All dimensions in mm(inch).)

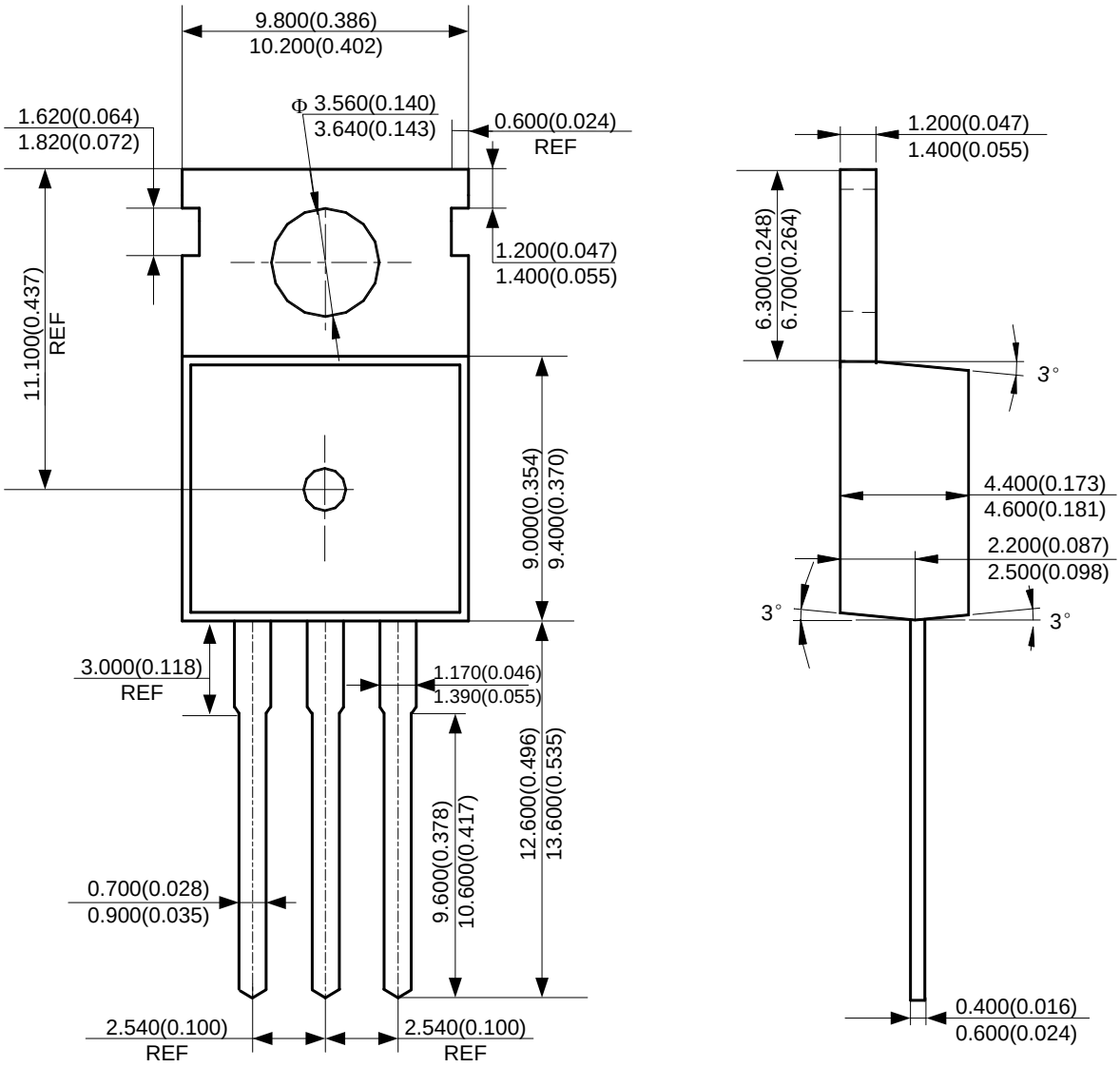
(1) Package Type: TO-220-3





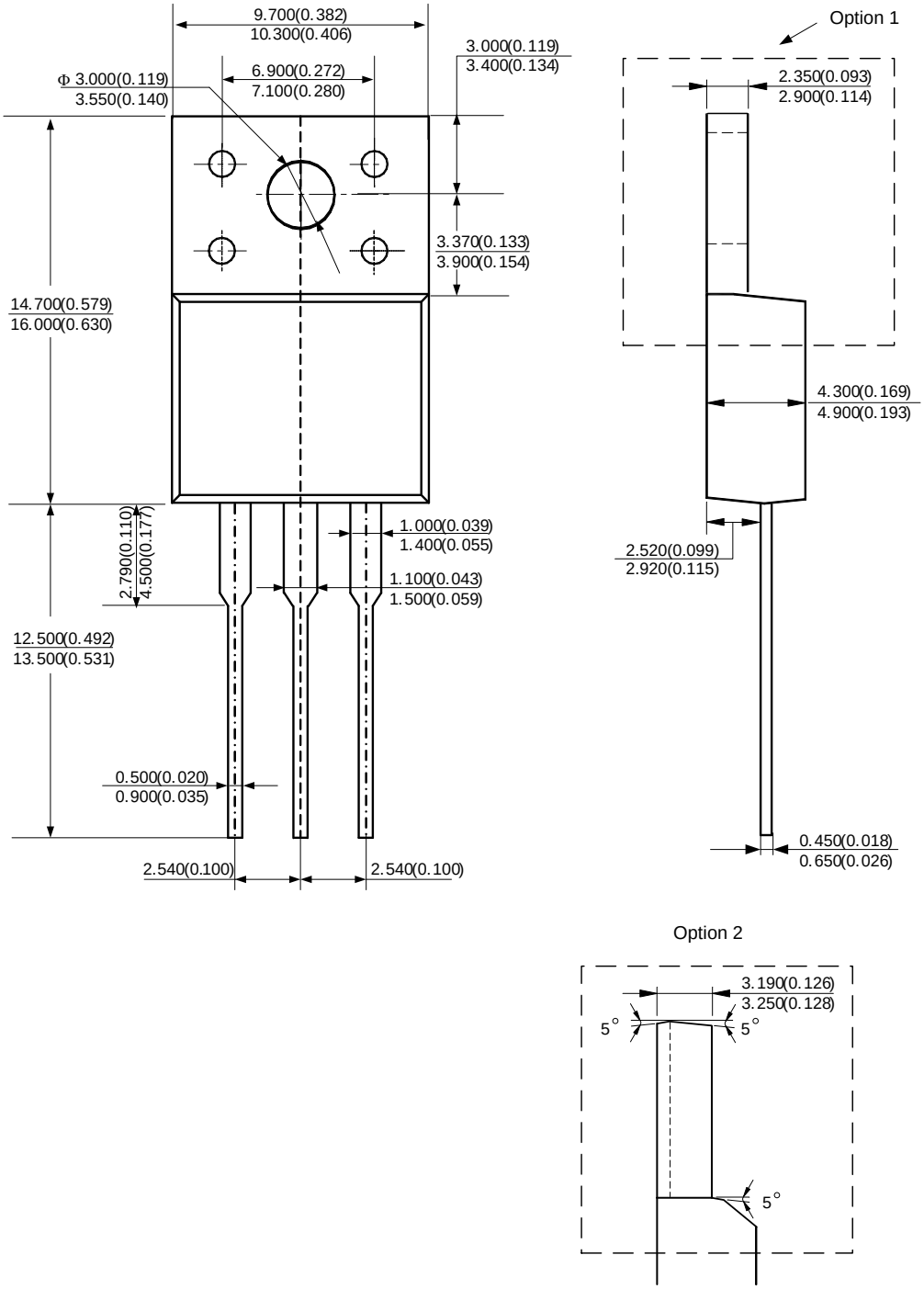
Package Outline Dimensions (continued) (All dimensions in mm(inch).)

(2) Package Type: TO-220-3 (2)



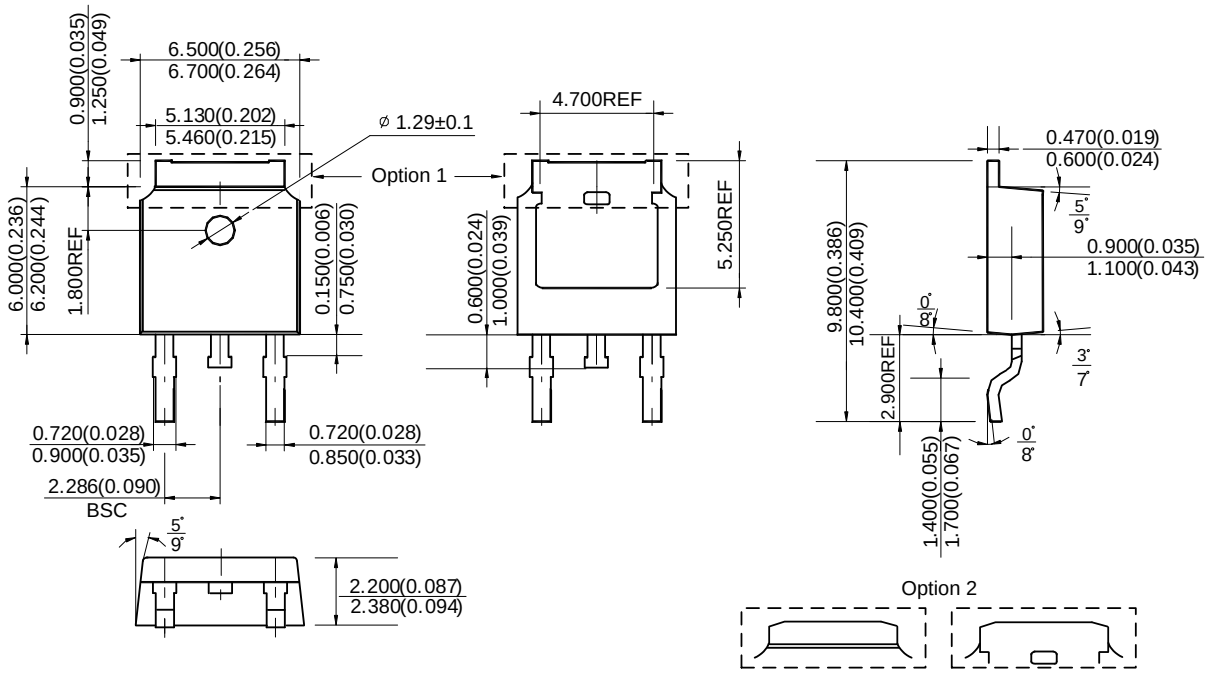
Package Outline Dimensions (continued) (All dimensions in mm(inch).)

(3) Package Type: TO-220F-3



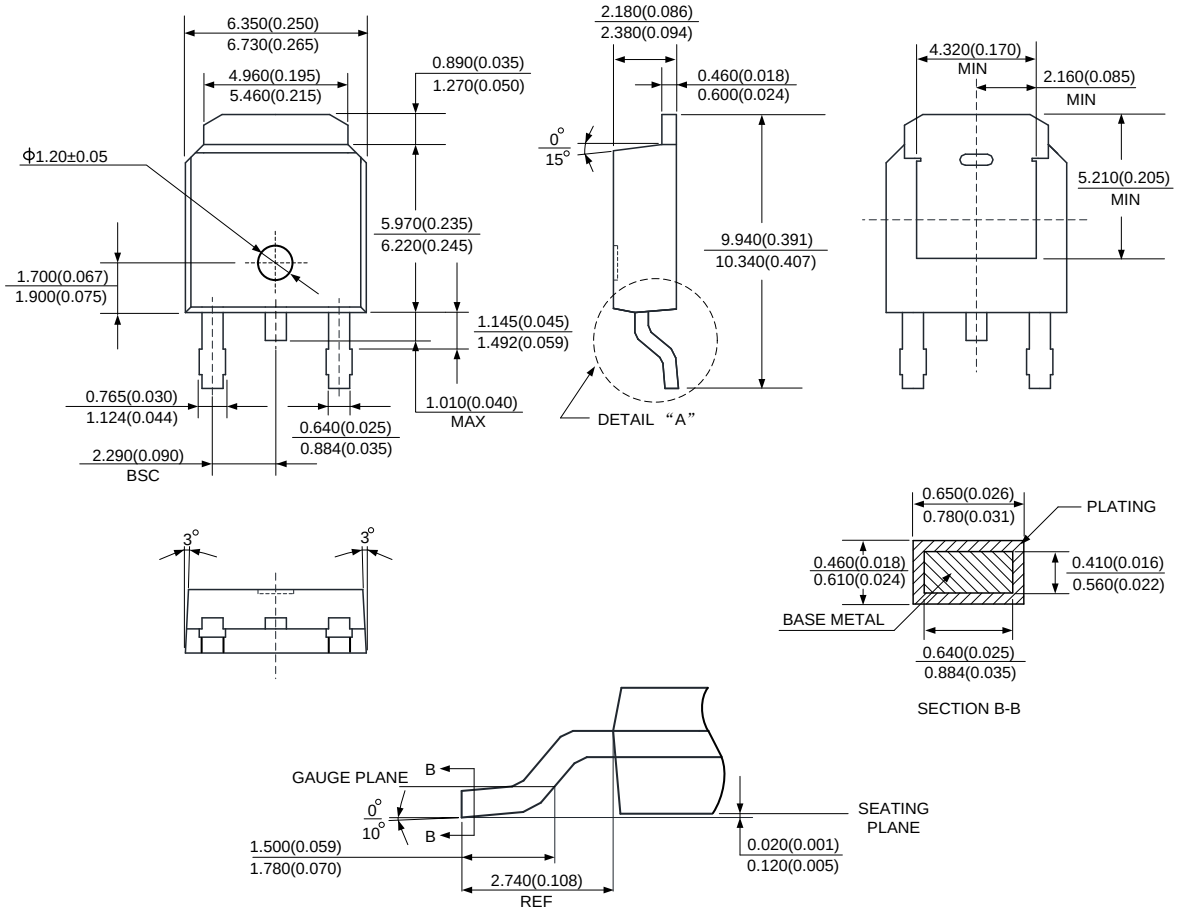
Package Outline Dimensions (continued) (All dimensions in mm(inch).)

(4) Package Type: TO-252-2 (3)



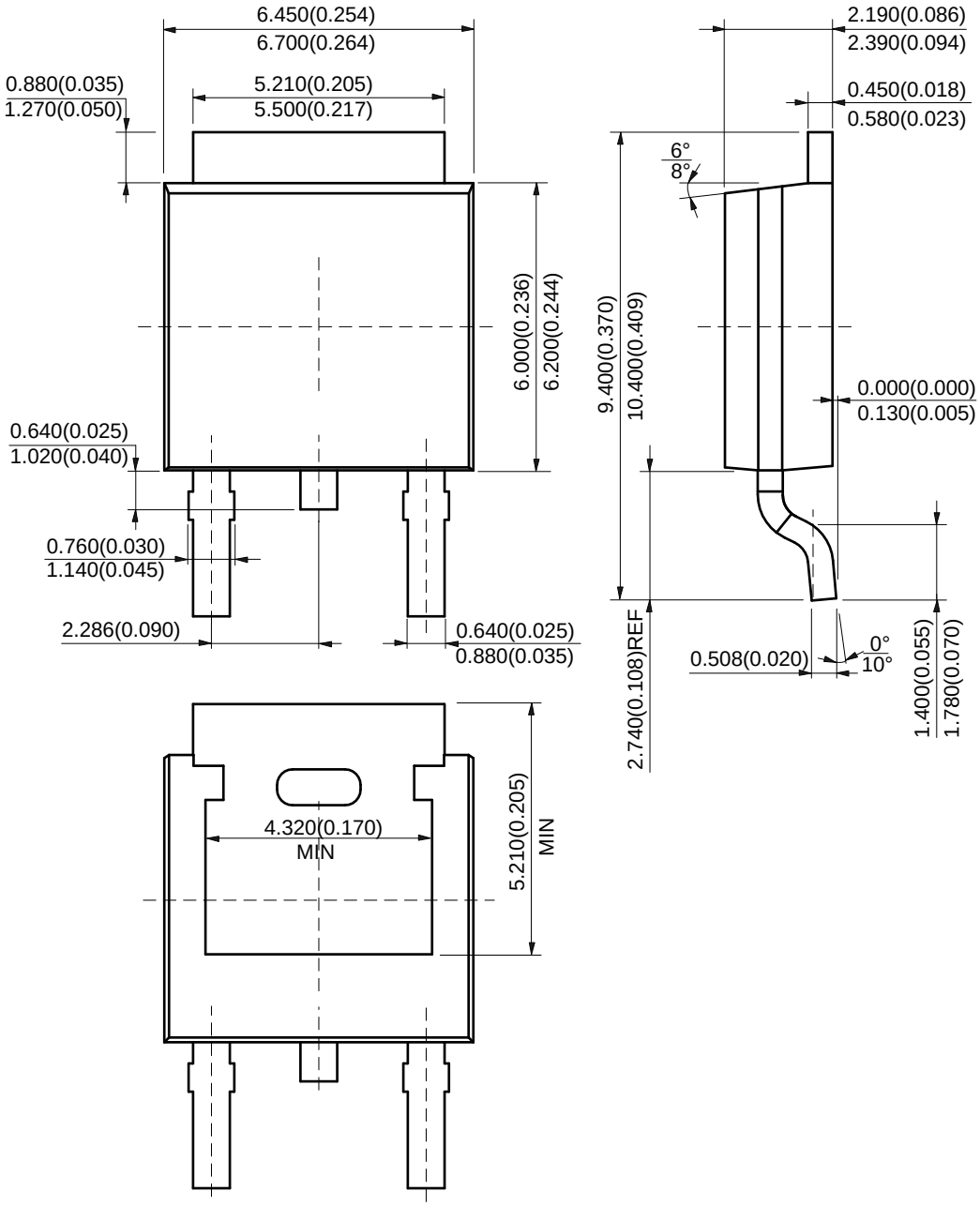
Package Outline Dimensions (continued) (All dimensions in mm(inch).)

(5) Package Type: TO-252-2 (4)



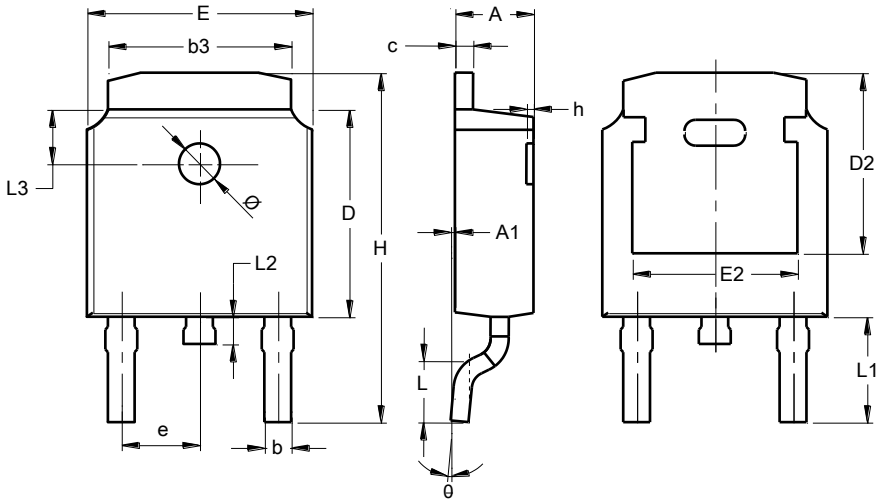
Package Outline Dimensions (continued) (All dimensions in mm(inch).)

(6) Package Type: TO-252-2 (5)



Package Outline Dimensions (continued)

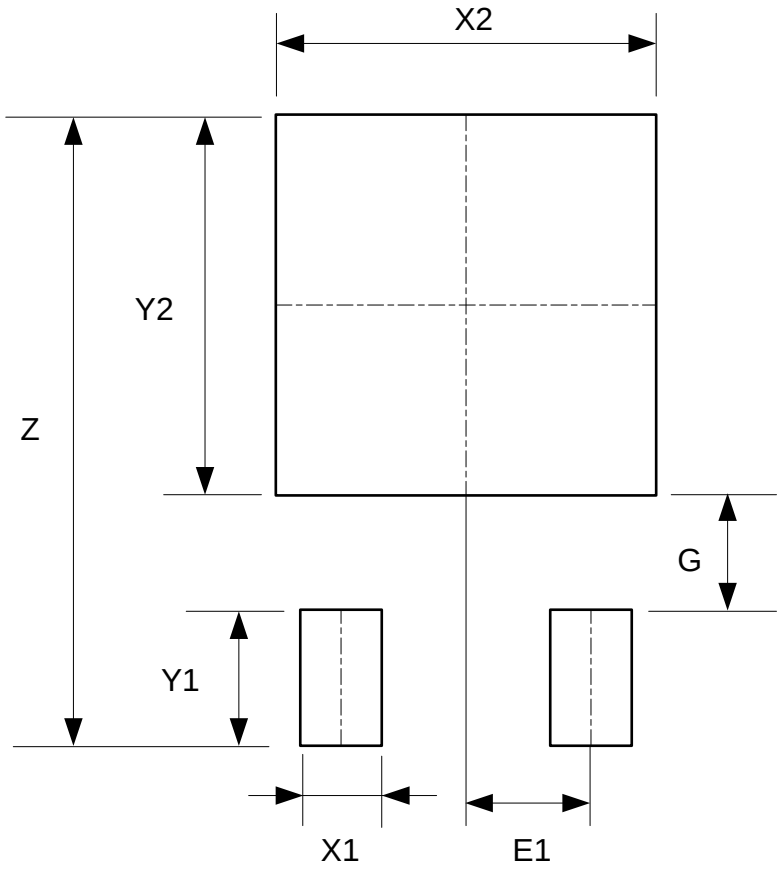
Package Type : TO252 (Type CJ)



TO252 (Type CJ)			
Dim	**Min**	**Max**	**Typ**
A	2.200	2.400	--
A1	0.000	0.127	--
b	0.635	0.770	--
b3	5.100	5.460	--
c	0.460	0.580	--
D	6.000	6.200	--
D2	5.250 REF		
E	6.500	6.700	--
E2	4.830 REF		
e	2.186	2.386	--
h	0.000	0.300	--
H	9.712	10.312	--
L	1.400	1.700	--
L1	2.900 REF		
L2	0.600	1.000	--
L3	1.600 REF		
Ø	1.100	1.300	--
θ	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

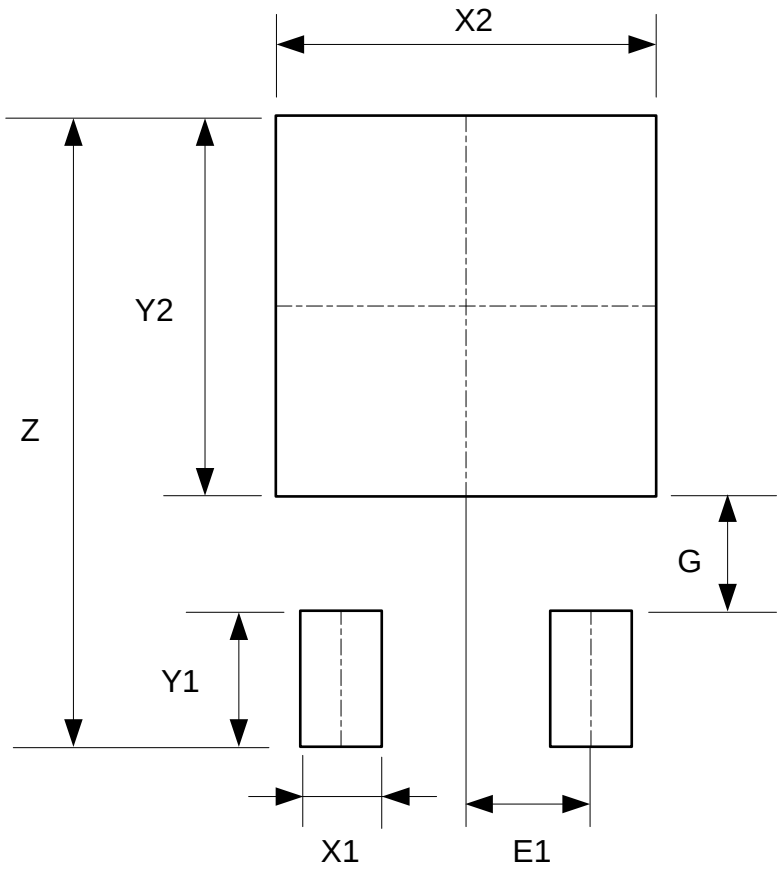
Package Type: TO-252-2 (3) / TO252 (Type CJ)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

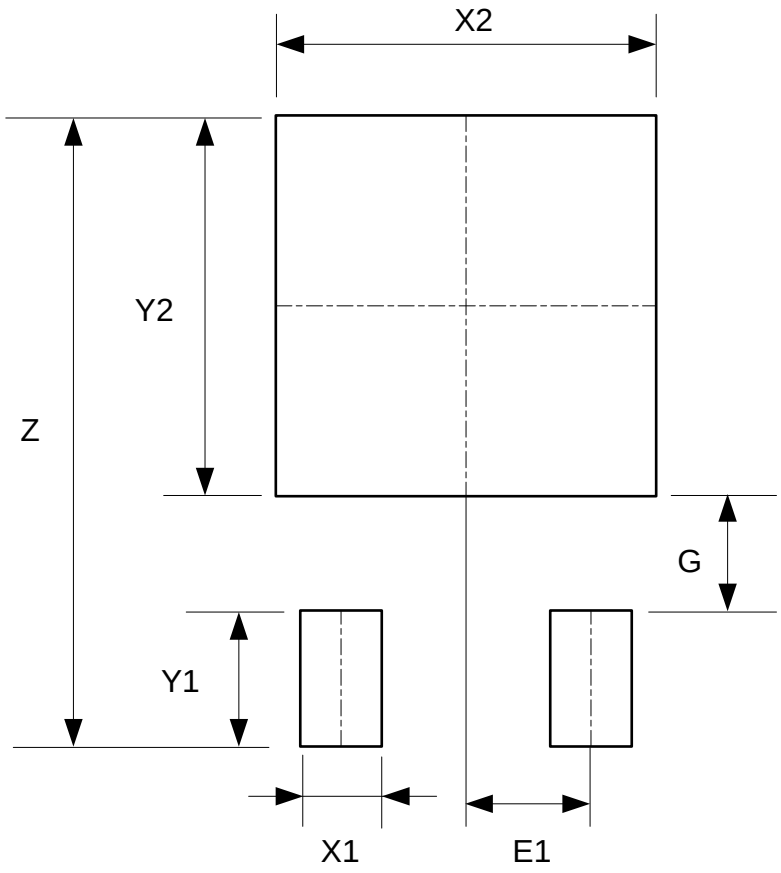
Package Type: TO-252-2 (4)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Suggested Pad Layout (continued)

(1) Package Type: TO-252-2 (5)



Dimensions	Z (mm)/(inch)	X1 (mm)/(inch)	X2 = Y2 (mm)/(inch)	Y1 (mm)/(inch)	G (mm)/(inch)	E1 (mm)/(inch)
Value	11.600/0.457	1.500/0.059	7.000/0.276	2.500/0.098	2.100/0.083	2.300/0.091

Mechanical Data

- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish—Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight:
  - TO252-2: 0.312 grams (Approximate)
  - TO220: 1.925 grams (Approximate)