Description

The AP2205 series is a positive voltage regulator IC fabricated by a high-voltage EPNP process.

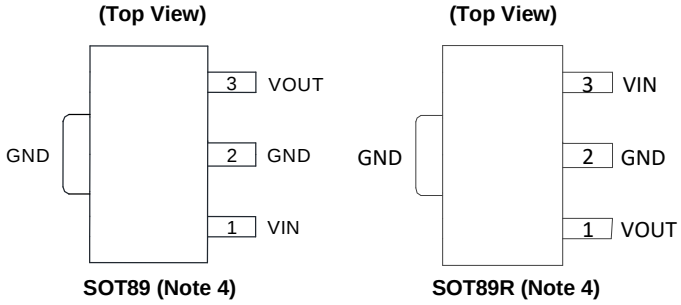
The AP2205 has various features such as a wide input voltage range, high accuracy, high ripple rejection, low dropout voltage, low noise, current limit, and ultra-low quiescent current—which make it ideal for use in various USB and portable devices.

The IC consists of a voltage reference, an error amplifier, a resistor network for setting output voltage, a current limit circuit for current protection, a chip enable circuit, a low power shutdown mode for extended battery life, overcurrent protection, overtemperature protection, as well as reverse current protection.

The AP2205 has 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 5.0V fixed voltage versions and an adjustable voltage version.

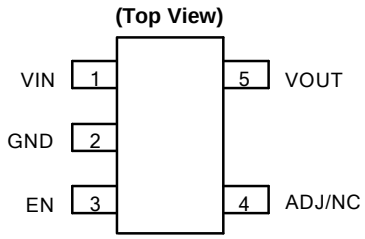
The AP2205 is available in the space-saving SOT25 and SOT89 packages.

Pin Assignments



SOT89 (Note 4) SOT89R (Note 4)

Note 4: The substrate/exposed pad should be connected to GND or open.



SOT25

Features

- Wide Input Voltage Range: 2.3V to 24V
- Wide Output Voltage Range: 1.24V to 22V
- Excellent Ripple Rejection: 60dB @ f = 1kHz
- Low Dropout Voltage: V_{DROP} = 100mV @ I_{OUT} = 100μA
- Low Ground Current
- High Output Voltage Accuracy
- Compatible with Low ESR Ceramic Capacitor
- Excellent Line/Load Regulation
- Thermal Shutdown Function
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/104/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

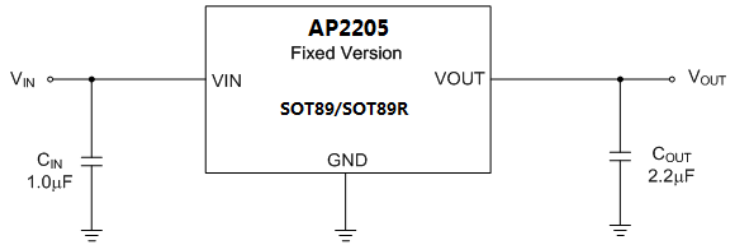
Applications

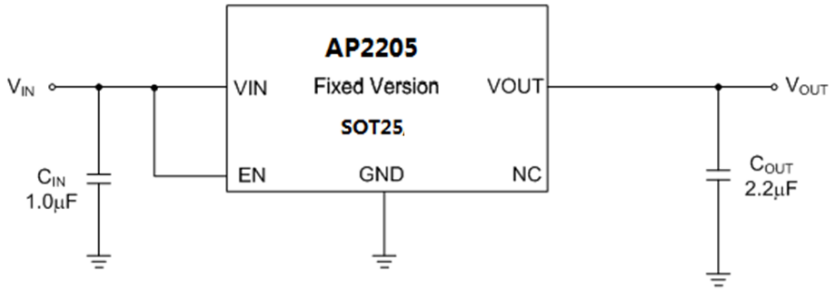
- Battery-powered equipments
- Laptops, palmtops, notebook computers
- Portable information appliances
- Industrial/Automotive applications

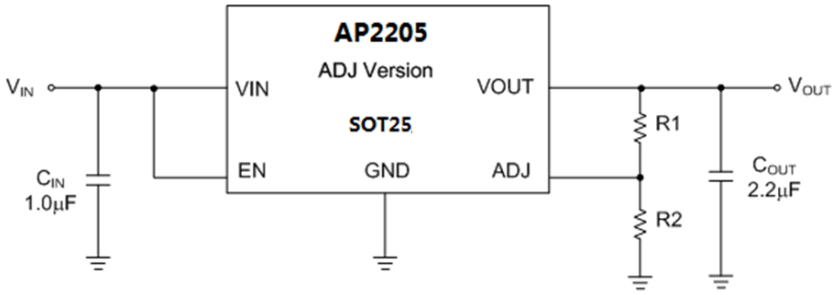
Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

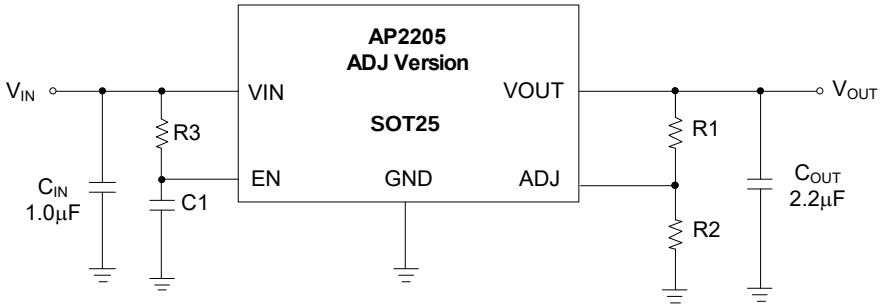
Typical Applications Circuit



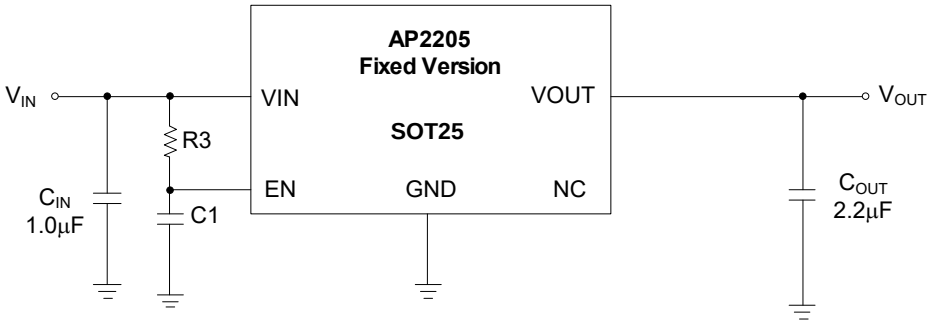




$V_{OUT} = V_{REF}(1+(R1/R2))$



Startup Time Adjustable by External R3C1 Circuit



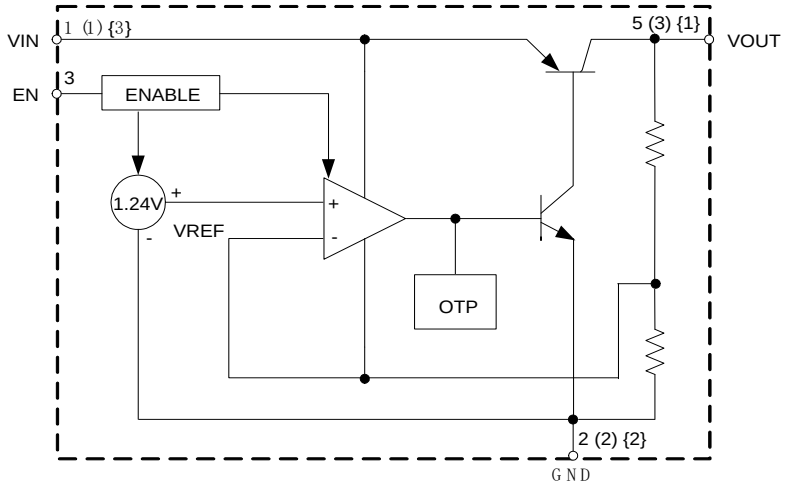
Startup Time Adjustable by External R3C1 Circuit

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Pin Descriptions

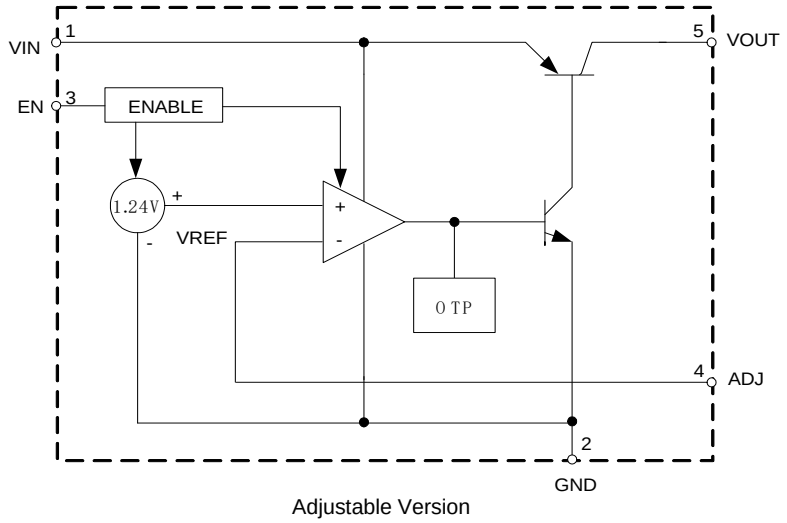
Pin Number			Pin Name	Function
SOT25	SOT89	SOT89R		
	Y	YR		
1	1	3	VIN	Input voltage
2	2	2	GND	Ground
3	—	—	EN	Enable input
4	—	—	ADJ/NC	Adjust output for ADJ version/Not connected for fixed version
5	3	1	VOUT	Regulated output voltage

Functional Block Diagram



A(B){C}
A: SOT25
B: SOT89
C: SOT89R

Fixed Version



SOT25

Adjustable Version

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Absolute Maximum Ratings (Note 5)

Symbol	Parameter	Rating		Unit
V_{IN}	Supply Input Voltage	36		V
V_{CE}	Enable Input Voltage	36		V
I_{OUT}	Output Current	250		mA
T_{LEAD}	Lead Temperature (Soldering, 10sec)	+260		°C
T_J	Operating Junction Temperature	+150		°C
θ_{JA}	Thermal Resistance (Note 6)	SOT25	160	°C/W
		SOT89/SOT89R	129	
θ_{JC}	Thermal Resistance	SOT25	29	°C/W
		SOT89/SOT89R	26	
T_{STG}	Storage Temperature Range	-65 to +150		°C
—	ESD (Charge Device Model)	1000		V
—	ESD (Human Body Model)	2000		V

Notes: 5. Stresses greater than those listed under *"Absolute Maximum Ratings"* can 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 can affect device reliability.

6. θ_{JA} is measured with the component mounted on a 2-Layer FR-4 PCB board with 1.5cm*1.5cm thermal sink pad in free air.

Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V_{IN}	Supply Input Voltage		2.3	24	V
T_J	Operating Junction Temperature		-40	+125	°C
I_{OUT}	Output Current	$V_{OUT} \leqq 1.8V$	—	150	mA
		$V_{OUT} > 1.8V$	—	200	

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Electrical Characteristics (@ V_{IN} = V_{OUT}+1V, T_J = +25°C, I_{OUT} = 100µA, C_{IN} = 1.0µF, C_{OUT} = 2.2µF, **Bold** typeface applies over -40°C ≤ T_J ≤ +125°C, unless otherwise specified.)

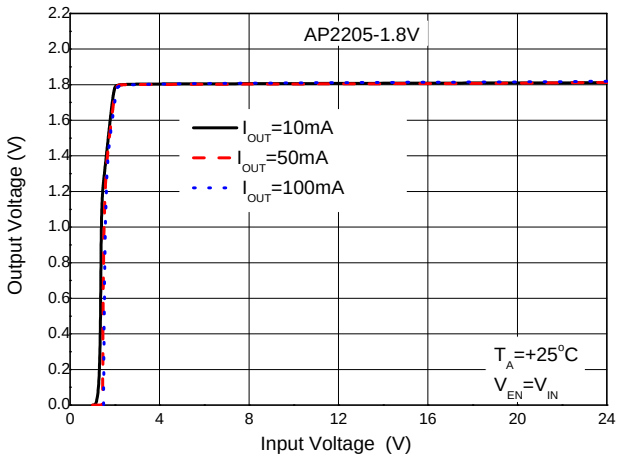
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{OUT}	Output Voltage	Variation from Specified V_{OUT}		V_{OUT} ×98%	—	V_{OUT} ×102%	V
V_{REF}	Reference Voltage	—		1.215	1.24	1.265	V
V_{IN}	Input Voltage	—		2.3	—	24	V
$I_{OUT(MAX)}$	Maximum Output Current	V_{IN}-V_{OUT} = 1V, V_{OUT} = 98% × V_{OUT}		200	250	—	mA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{OUT} + 1V ≤ V_{IN} ≤ 24V		—	0.05	—	%
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	1mA ≤ I_{OUT} ≤ 200mA		—	0.5	—	%
V_{DROP}	Dropout Voltage (Note 7)	I_{OUT} = 100µA		—	100	150	mV
		I_{OUT} = 50mA		—	270	350	
		I_{OUT} = 100mA		—	320	460	
		I_{OUT} = 150mA		—	360	500	
I_{GND}	Ground Current	I_{OUT} = 100µA		—	36	—	µA
		I_{OUT} = 50mA		—	0.5	—	mA
		I_{OUT} = 100mA		—	1.3	—	
		I_{OUT} = 150mA		—	2.5	—	
I_{STD}	Standby Current	V_{IN} = V_{OUT}+1V V_{EN} in OFF Mode		—	0.01	1.0	µA
PSRR	Power Supply Rejection Ration	Ripple 0.5V_{P-P} V_{IN} = V_{OUT}+1V	f = 100Hz	—	60	—	dB
			f = 1kHz	—	60	—	
$\Delta V_{OUT}/(V_{OUT}\times\Delta T)$	Output Voltage Temperature Coefficient	I_{OUT} = 100µA, -40°C ≤ T_J ≤ +125°C		—	±100	—	ppm/°C
V_{NOI}	RMS Output Noise	T_J = +25°C, 10Hz ≤ f ≤ 100kHz		—	30	—	μV_{RMS}
I_{ADJ}	ADJ Pin Current	I_{OUT} = 100µA		—	0.5	—	µA
I_{EN}	EN Pin Current	V_{EN} = V_{OUT} + 1V		—	3	—	µA
—	EN “High” Voltage	EN Input Voltage “High”		2.0	—	—	V
—	EN “Low” Voltage	EN Input Voltage “Low”		—	—	0.4	V

Note: 7. Dropout voltage is only valid when V_{OUT} ≥ 2.3V because of the minimum input voltage limits.

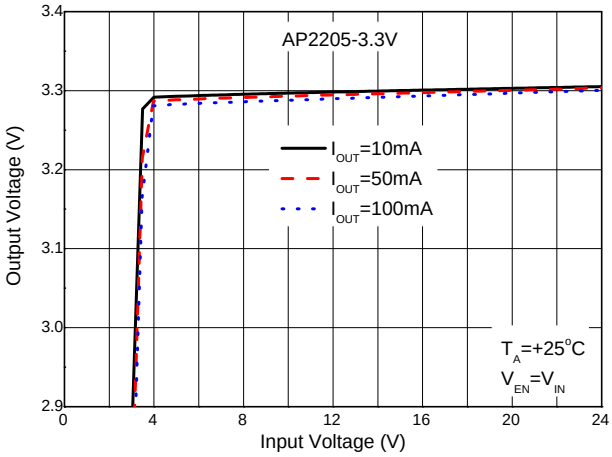
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics

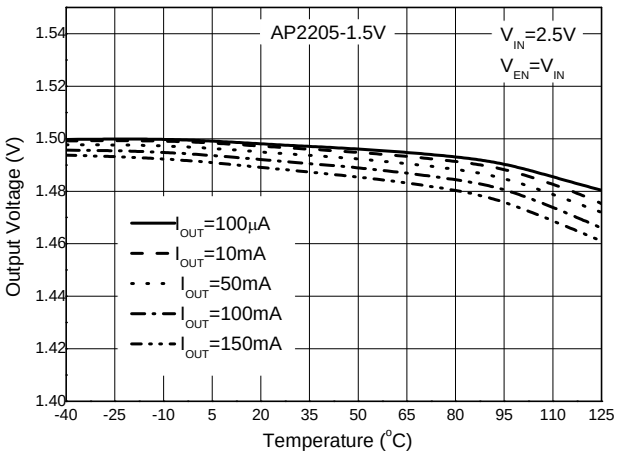
Output Voltage vs. Input Voltage



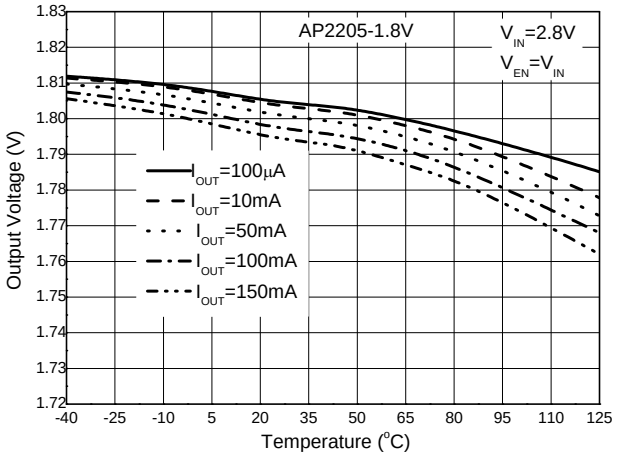
Output Voltage vs. Input Voltage



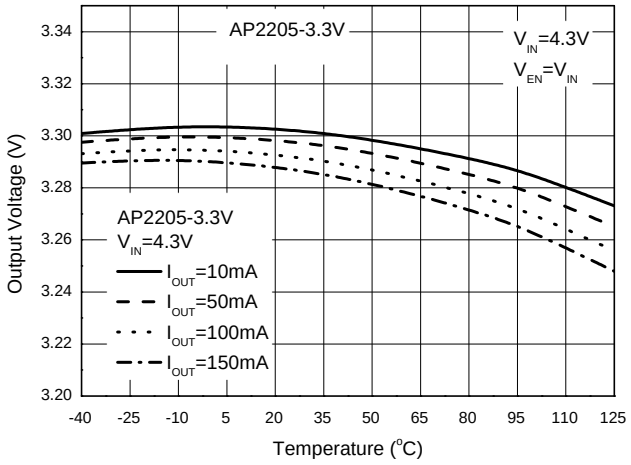
Output Voltage vs. Temperature



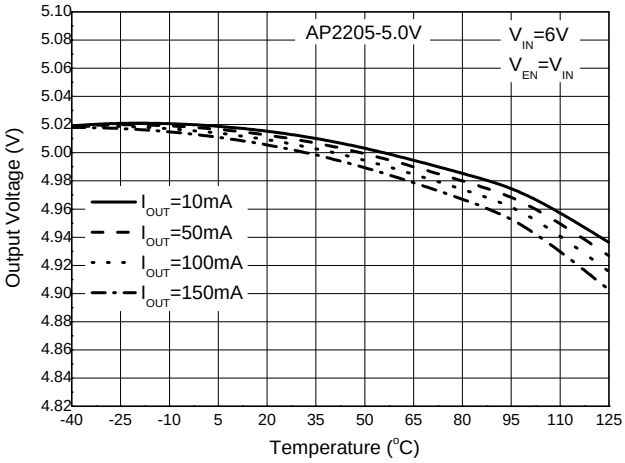
Output Voltage vs. Temperature



Output Voltage vs. Temperature



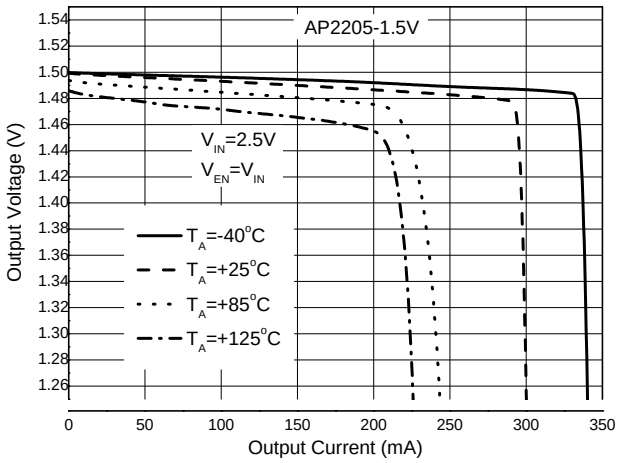
Output Voltage vs. Temperature



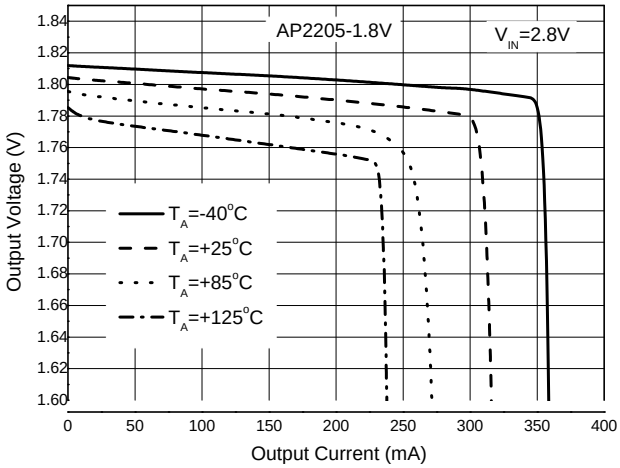
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics (continued)

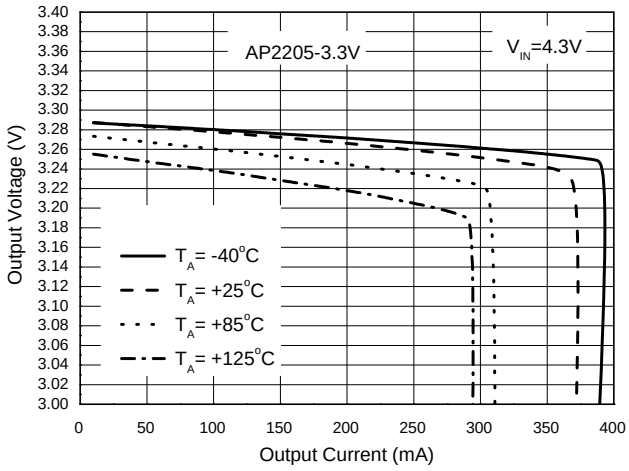
Output Voltage vs. Output Current



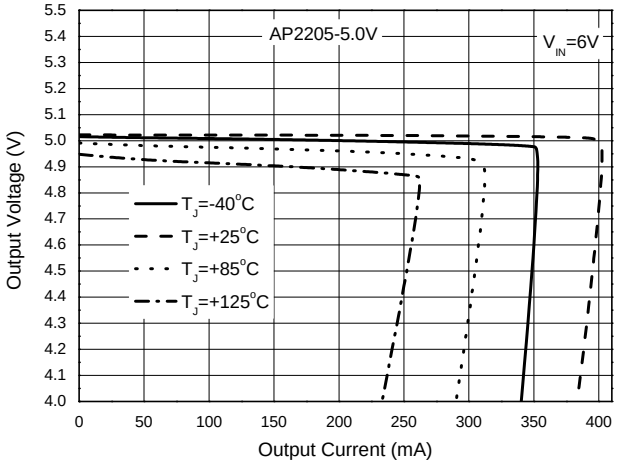
Output Voltage vs. Output Current



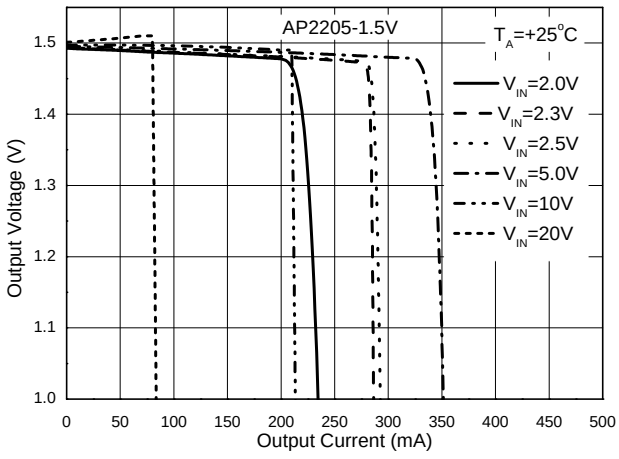
Output Voltage vs. Output Current



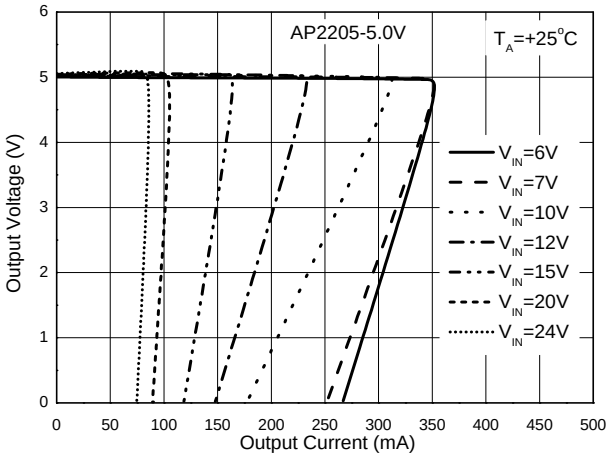
Output Voltage vs. Output Current



Output Voltage vs. Output Current



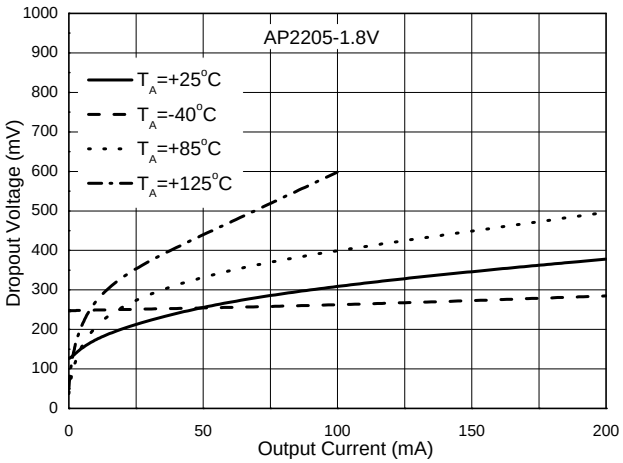
Output Voltage vs. Output Current



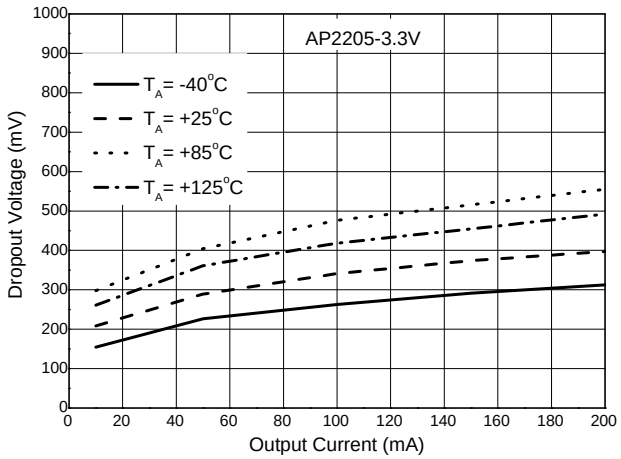
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics (continued)

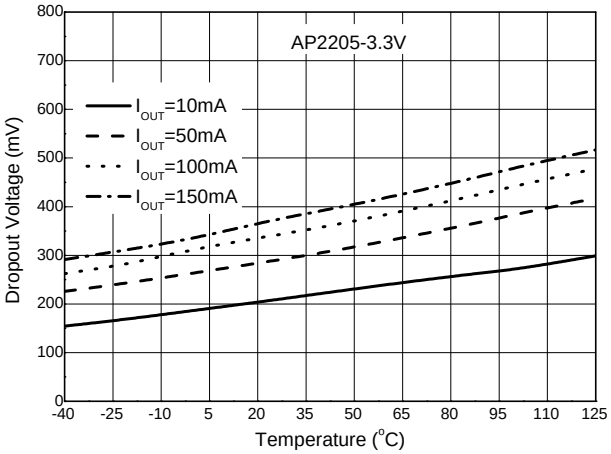
Dropout Voltage vs. Output Current



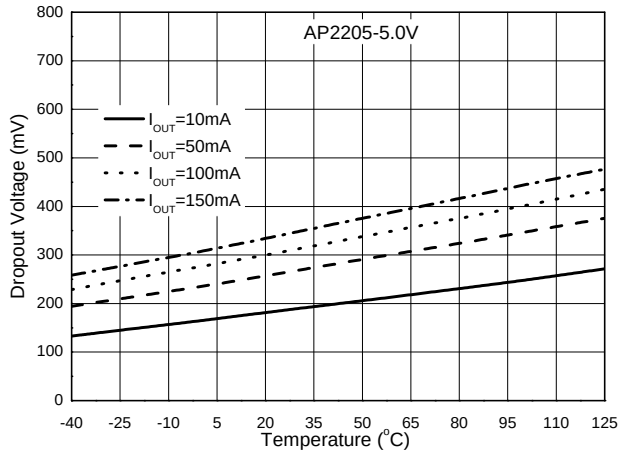
Dropout Voltage vs. Output Current



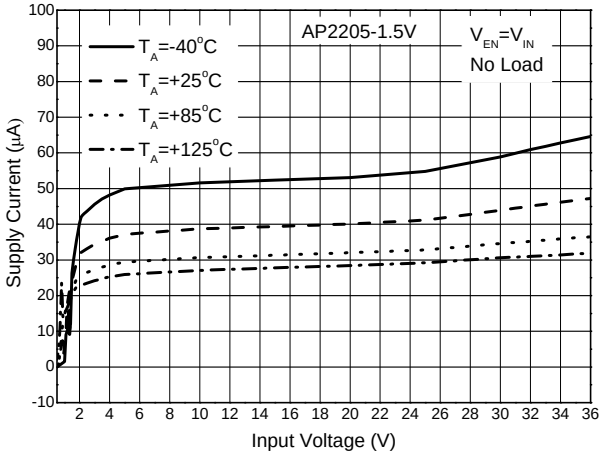
Dropout Voltage vs. Temperature



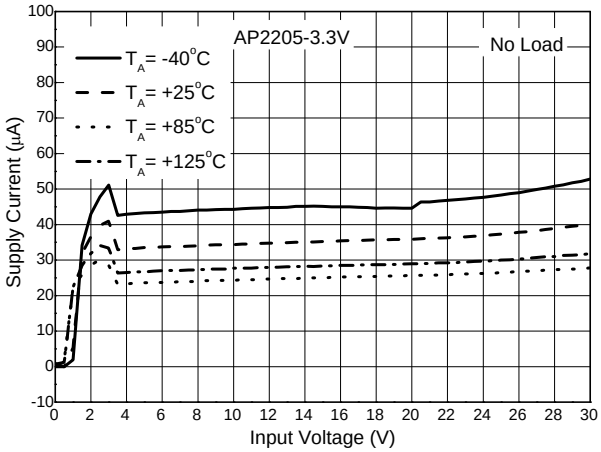
Dropout Voltage vs. Temperature



Supply Current vs. Input Voltage



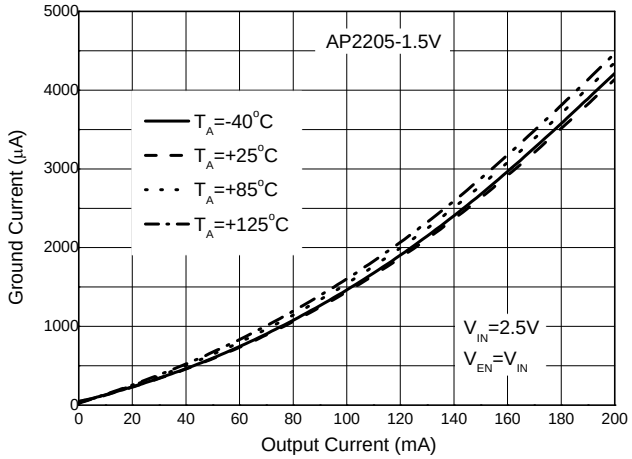
Supply Current vs. Input Voltage



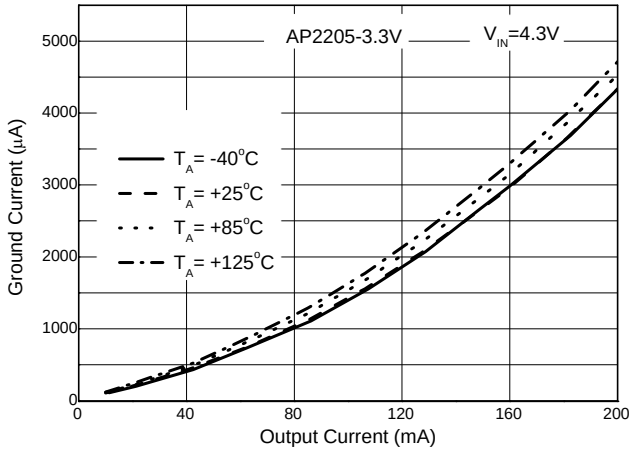
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics (continued)

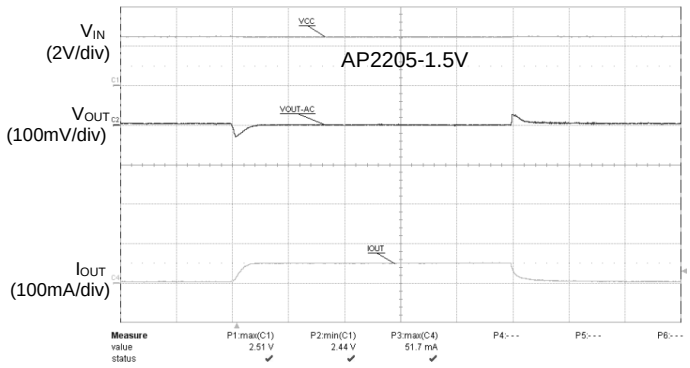
Ground Current vs. Output Current



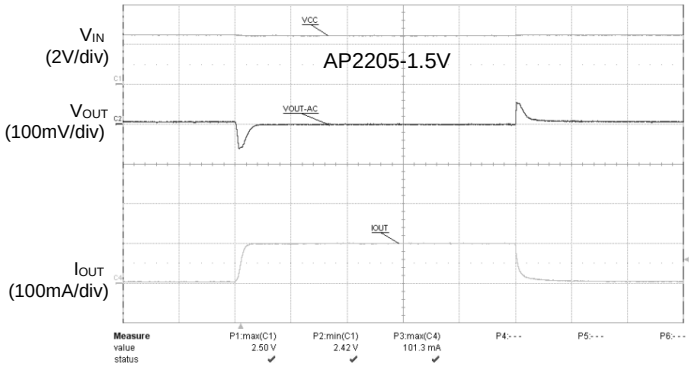
Ground Current vs. Output Current



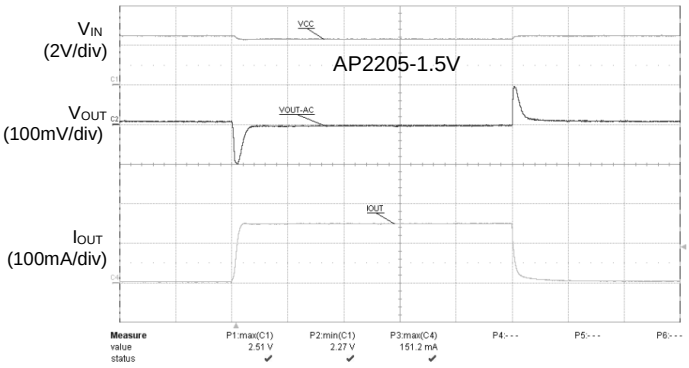
Load Transient
(Conditions: V_{IN}=2.5V, C_{IN}=1.0µF, C_{OUT}=2.2µF, I_{OUT}=1mA to 50mA)



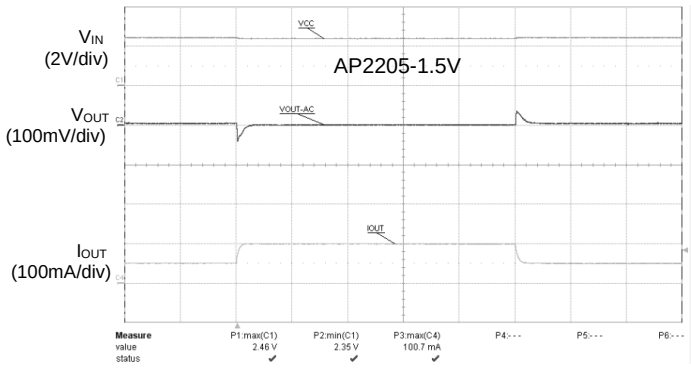
Load Transient
(Conditions: V_{IN}=2.5V, C_{IN}=1.0µF, C_{OUT}=2.2µF, I_{OUT}=1mA to 100mA)



Load Transient
(Conditions: V_{IN}=2.5V, C_{IN}=1.0µF, C_{OUT}=2.2µF, I_{OUT}=1mA to 150mA)



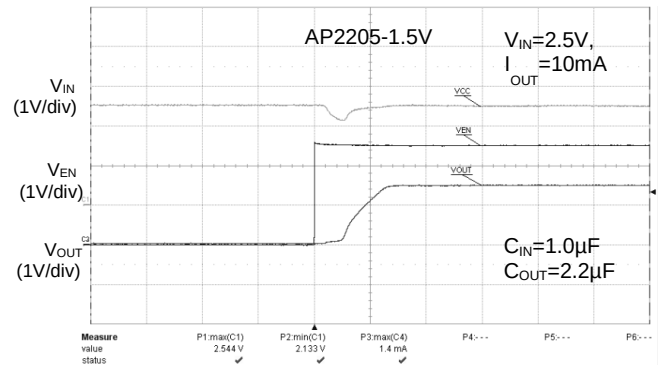
Load Transient
(Conditions: V_{IN}=2.5V, C_{IN}=1.0µF, C_{OUT}=2.2µF, I_{OUT}=50mA to 100mA)



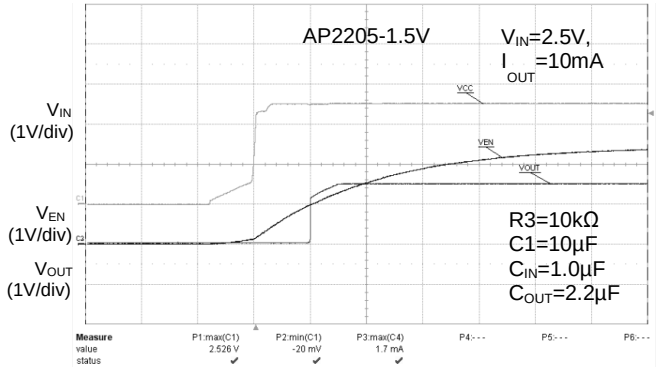
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics (continued)

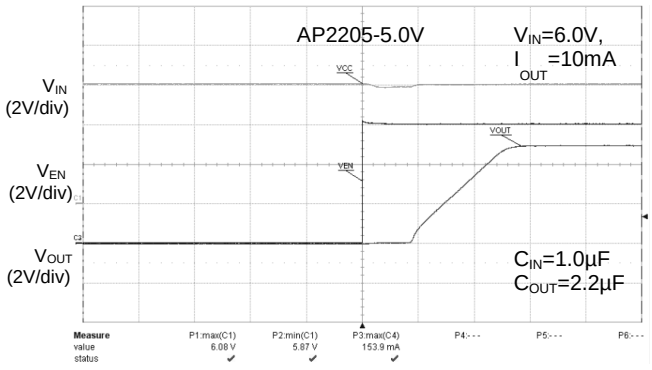
Enable Input Response



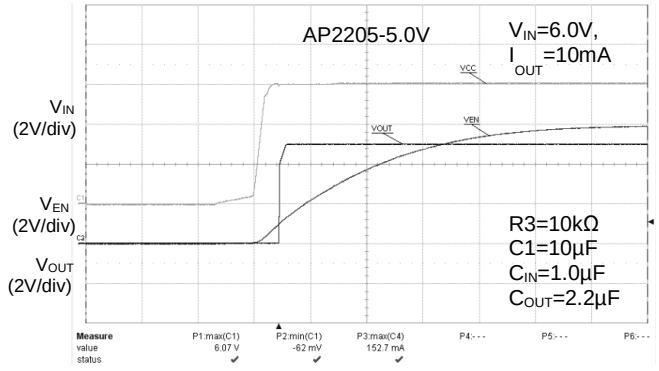
Adjustable Start-up Time by RC



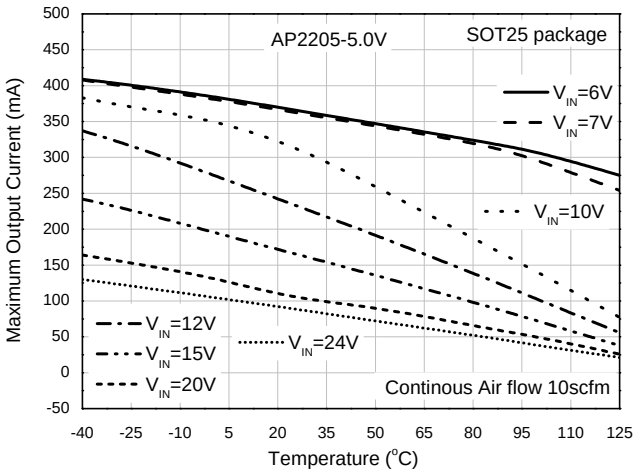
Enable Input Response



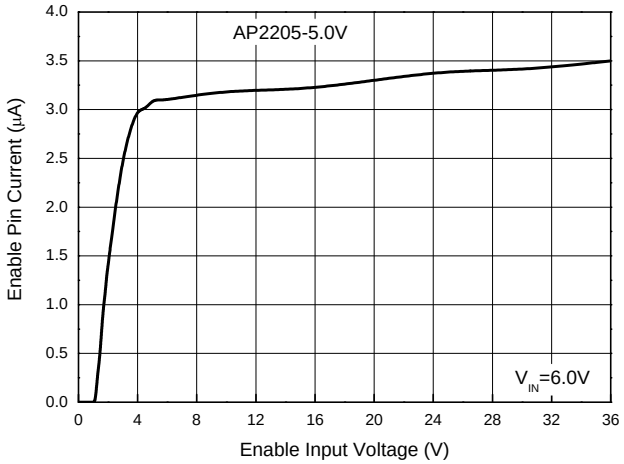
Adjustable Start-up Time by RC



Maximum Output Current vs. Ambient Temperature



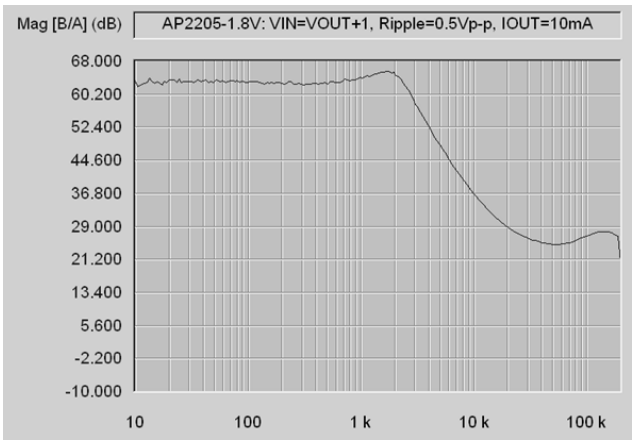
Enable Pin Current vs. Enable Input Voltage



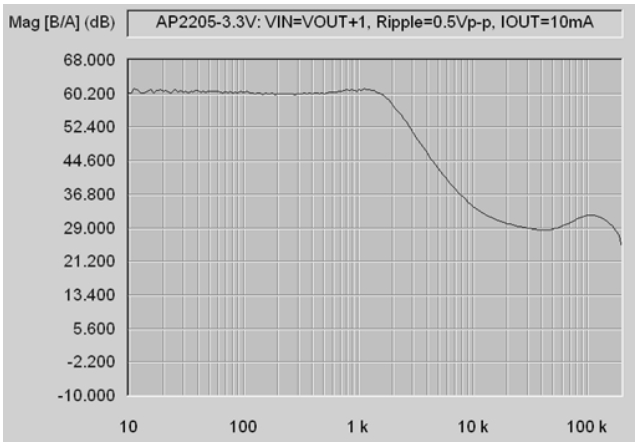
© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Performance Characteristics (continued)

PSRR vs. Frequency



PSRR vs. Frequency



Ordering Information

AP2205 - X X - X

Product Name	Output Voltage	Package	Packing
	Blank : Adjustable Output 15 : Fixed Output 1.5V 18 : Fixed Output 1.8V 25 : Fixed Output 2.5V 28 : Fixed Output 2.8V 30 : Fixed Output 3.0V 33 : Fixed Output 3.3V 50 : Fixed Output 5.0V	W5 : SOT25 Y/YR : SOT89	7/7R/13 : 7"/13" Tape & Reel

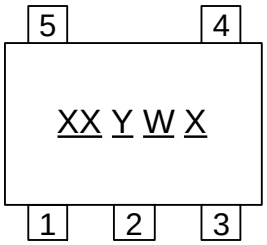
Part Number	Package Code	Package	Packing	
			Qty.	Carrier
AP2205-XXY-13	Y	SOT89	2,500	13” Tape & Reel
AP2205-XXY-7R	Y	SOT89	1,000	7” Tape & Reel
AP2205-XXYR-13	YR	SOT89	2,500	13” Tape & Reel
AP2205-W5-7	W5	SOT25	3,000	7” Tape & Reel
AP2205-XXW5-7	W5	SOT25	3,000	7” Tape & Reel

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Marking Information

(1) SOT25

(Top View)



XX : Identification Code
Y : Year 0 to 9
W : Week : A to Z : 1 to 26 Week;
a to z : 27 to 52 Week; z Represents 52 and 53 Week
X : Internal Code

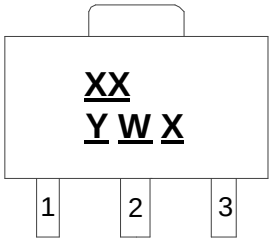
Part Number	Package	Identification Code
AP2205-W5-7	SOT25	5A
AP2205-15W5-7	SOT25	5B
AP2205-18W5-7	SOT25	5C
AP2205-25W5-7	SOT25	5D
AP2205-28W5-7	SOT25	5E
AP2205-30W5-7	SOT25	5F
AP2205-33W5-7	SOT25	5G
AP2205-50W5-7	SOT25	5H

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Marking Information (continued)

(2) SOT89

(Top View)



XX : Identification Code
Y : Year : 0 to 9
W : Week : A to Z : 1 to 26 Week;
a to z : 27 to 52 Week;
z Represents 52 and 53 Week
X : Internal Code

Part Number	Package	Identification Code
AP2205-15Y-13	SOT89	5B
AP2205-18Y-13	SOT89	5C
AP2205-25Y-13	SOT89	5D
AP2205-28Y-13	SOT89	5E
AP2205-30Y-13	SOT89	5F
AP2205-33Y-13	SOT89	5G
AP2205-50Y-13	SOT89	5H
AP2205-15YR-13	SOT89	6B
AP2205-18YR-13	SOT89	6C
AP2205-25YR-13	SOT89	6D
AP2205-28YR-13	SOT89	6E
AP2205-30YR-13	SOT89	6F
AP2205-33YR-13	SOT89	6G
AP2205-50YR-13	SOT89	6H

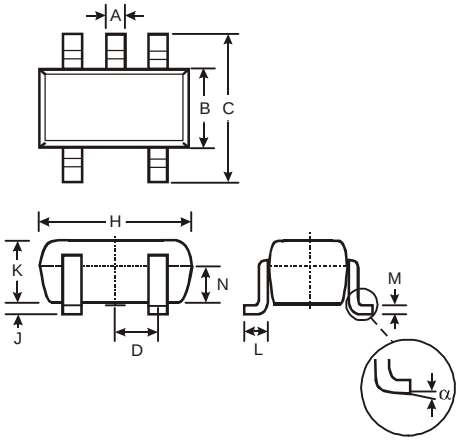
Part Number	Package	Identification Code
AP2205-33Y-7R	SOT89	6G
AP2205-50Y-7R	SOT89	6H

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Package Outline Dimensions

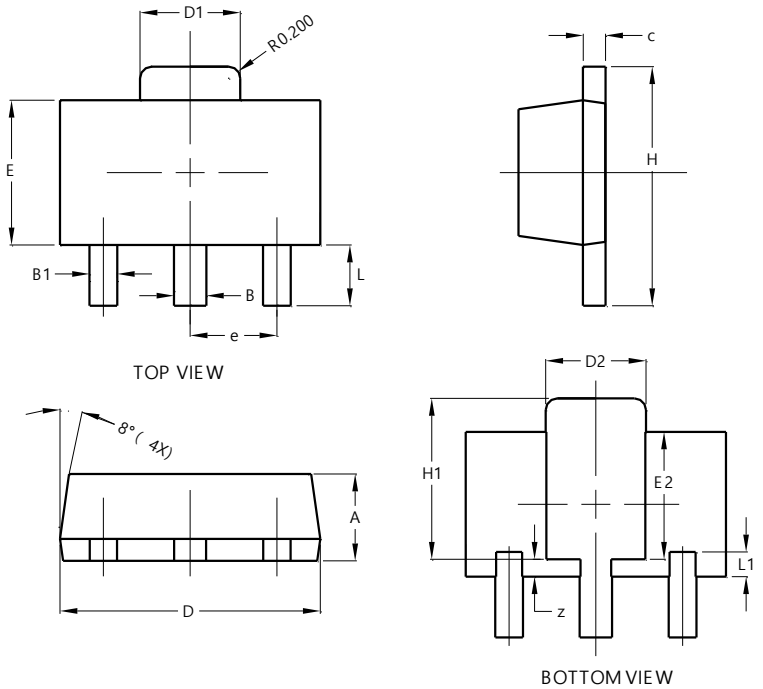
Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT25



SOT25			
Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

(2) Package Type: SOT89



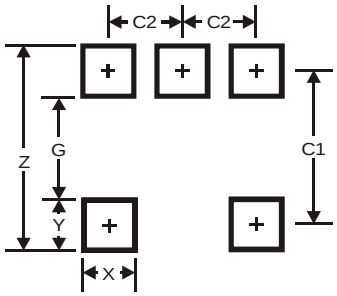
SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

Suggested Pad Layout

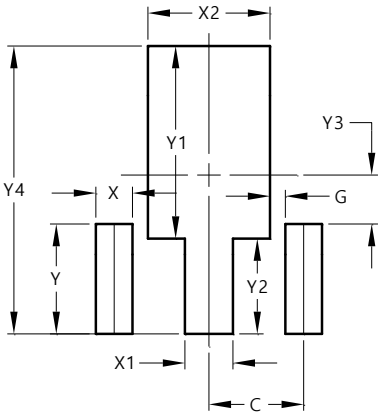
Please see http://www.diodes.com/package-outlines.html for the latest version.

(1) Package Type: SOT25



Dimensions	Value
Z	3.20
G	1.60
X	0.55
Y	0.80
C1	2.40
C2	0.95

(2) Package Type: SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

Mechanical Data

- Moisture Sensitivity:
  - SOT89: Level 3 Per J-STD-020
  - SOT25: Level 1 Per J-STD-020
- Terminals: SOT89/SOT25: Finish—Mate Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight:
  - SOT89: 0.062 grams (Approximate)
  - SOT25: 0.0157 grams (Approximate)

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.

3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.

4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.

5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.

7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.

8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.

9. This Notice may be periodically updated with the most recent version available at https://www.diodes.com/about/company/terms-and-conditions/important-notice

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2023 Diodes Incorporated. All Rights Reserved.

www.diodes.com

© 2023 Copyright Diodes Incorporated. All Rights Reserved.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.