FAIRCHILD

A Schlumberger Company

MIL-STD-883
July 1986—Rev 1[5]

μA7905QB 3-Terminal Negative Voltage Regulator

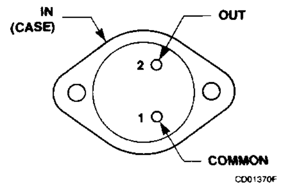
Aerospace and Defense Data Sheet
Linear Products

Description

The μA7905QB 3-Terminal Negative Voltage Regulator is constructed using the Fairchild Planar Epitaxial process. This negative regulator is intended as a complement to the popular μA7805QB Positive Voltage Regulator. The μA7905QB employs internal current-limiting, safe-area protection, and thermal shutdown, making it virtually indestructible.[6]

- **Output Current In Excess Of 1 A**
- **Internal Thermal Overload Protection**
- **Internal Short Circuit Current-Limiting**
- **Output Transistor Safe-Area Compensation**

Connection Diagram
2-Lead TO-3 Can
(Top View)



Order Information

Part No.	Case/ Finish	Package Code Mil-M-38510, Appendix C
μA7905KMQB	YC	2-Lead Can

JAN Product Available

11505	BYA	2-Lead Can
11505	BYC	2-Lead Can

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Absolute Maximum Ratings

Storage Temperature Range	-65°C to +175°C
Operating Temperature Range	-55°C to +125°C
Lead Temperature (soldering, 60 s)	300°C
Internal Power Dissipation[9]	
Can Without Heat Sink[10]	0.71 W
Can With Heat Sink[11]	5.6 W
Input Voltage	-35 V

Notes
1. 100% Test and Group A
2. Group A
3. Periodic tests, Group C
4. Guaranteed but not tested
5. When changes occur, FSC will make data sheet revisions available. Contact local sales representative for the latest revision.
6. For more information on device function, refer to the Fairchild Linear Data Book Commercial Section.
7. All characteristics except line and load transient response and noise are measured using pulse techniques ($t_W \leq 10$ ms, duty cycle $\leq 5\%$). Output voltage changes due to changes in the internal temperature must be taken into account separately.
8. Conditions given will result in the following: $P_D \leq 15$ W.
9. Internally limited.
10. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 35°C/W.
11. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 4.46°C/W.

Processing: MIL-STD-883, Method 5004

Burn-In: Method 1015, Condition A, PDA calculated using Method 5005, Subgroup 1

Quality Conformance Inspection: MIL-STD-883, Method 5005

Group A Electrical Tests Subgroups:
1. Static tests at 25°C
2. Static tests at 125°C
3. Static tests at -55°C
4. Dynamic tests at 25°C
5. Dynamic tests at 125°C
6. Dynamic tests at −55°C
9. AC tests at 25°C

Group C and D Endpoints: Group A, Subgroup 1

μA7905QB
Electrical Characteristics $V_I = -10$ V, $I_L = 500$ mA, $C_I = 2.0$ μF, $C_O = 1.0$ μF, unless otherwise specified.[7]

Symbol	Characteristic	Condition		Min	Max	Unit	Note	Subgrp
V_O	Output Voltage[8]			-5.2	-4.8	V	1	1
		5.0 mA ≤ I_L ≤ 1.0 A	$V_I = -8.0$ V	-5.3	-4.7	V	1	1,2,3
			$V_I = -20$ V	-5.3	-4.7	V	1	1,2,3
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_L = 5.0$ mA, 25°C ≤ T_A ≤ 125°C			1.5	mV/°C	4	2
		$I_L = 5.0$ mA, -55°C ≤ T_A ≤ 25°C			1.5	mV/°C	4	3
$V_{R\ LINE}$	Line Regulation	-25 V ≤ V_I ≤ -7.0 V			50	mV	1	1
		-25 V ≤ V_I ≤ -8.0 V			75	mV	1	2,3
		-12 V ≤ V_I ≤ -8.0 V			25	mV	1	1
					50	mV	1	2,3
$V_{R\ LOAD}$	Load Regulation	5.0 mA ≤ I_L ≤ 1.5 A			100	mV	1	1,2,3
		250 mA ≤ I_L ≤ 750 mA			35	mV	1	1
					60	mV	1	2,3
I_{SCD}	Standby Current Drain				2.0	mA	1	1
					3.0	mA	1	2,3
ΔI_{SCD} (LINE)	Standby Current Drain Change (vs Line Voltage)	-25 V ≤ V_I ≤ -8.0 V			1.3	mA	1	1,2,3
ΔI_{SCD} (LOAD)	Standby Current Drain Change (vs Load Current)	5.0 mA ≤ I_L ≤ 1.0 A			0.5	mA	1	1,2,3
V_{DO}	Dropout Voltage	$I_L = 1.0$ A			2.3	V	1	1
I_{OS}	Short Circuit Current	$V_I = -35$ V			2.0	A	1	1,2,3
I_{pk}	Peak Output Current	$V_I = -8.0$ V, $\Delta V_O = 0.48$ V		1.0	4.0	A	1	1,2,3
V_{RTH}	Thermal Regulation	$V_I = -15$ V, $I_L = 1.0$ A			50	mV	1	1
V_{START}	Voltage Start	$V_I = -20$ V, $R_L = 5.0$ Ω		-5.25	-4.75	V	4	1,2,3
$\Delta V_I/\Delta V_O$	Ripple Rejection	$V_I = -10$ V, $I_L = 350$ mA, $e_i = 1.0$ V_{rms}, f = 2400 Hz		45		dB	1	4,5,6
N_O	Noise	$V_I = -10$ V, $I_L = 100$ mA, 10 Hz ≤ f ≤ 10 kHz			250	μV_{rms}	4	9
$\Delta V_O/\Delta V_I$	Line Transient Response	$V_I = -10$ V, $I_L = 5.0$ mA, $V_{pulse} = -3.0$ V			30	mV/V	4	9
$\Delta V_O/\Delta I_L$	Load Transient Response	$V_I = -10$ V, $I_L = 100$ mA, $\Delta I_L = 400$ mA			2.5	mV/mA	4	9

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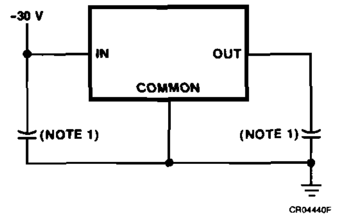
Primary Burn-In Circuit

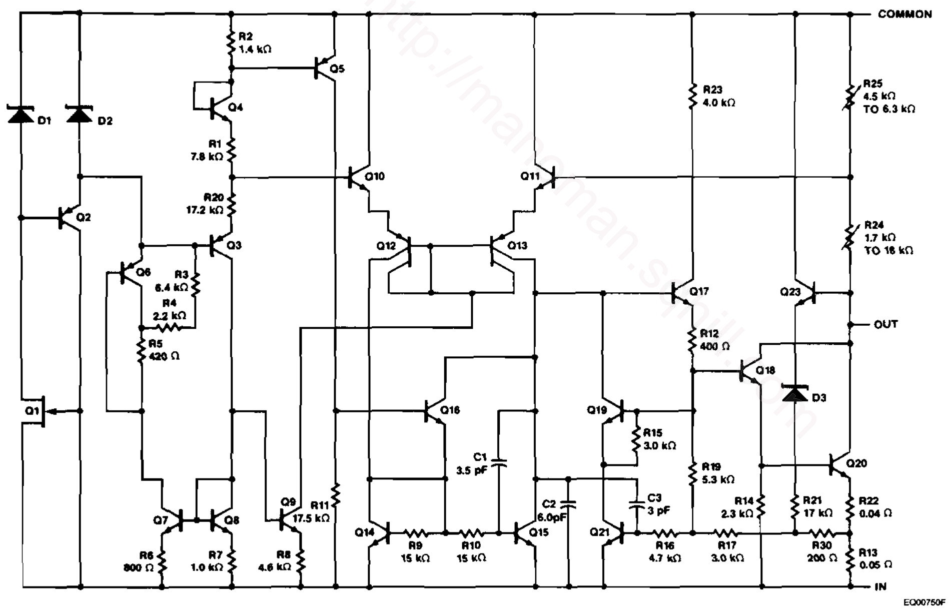
(38510/11505 may be used by FSC as an alternate)



Note

1. Capacitor value necessary to suppress oscillations.

Equivalent Circuit



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A Schlumberger Company

MIL-STD-883
July 1986—Rev 1[5]

μA7912QB 3-Terminal Negative Voltage Regulator

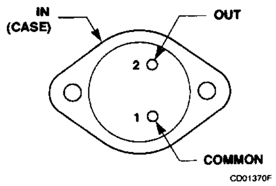
Aerospace and Defense Data Sheet
Linear Products

Description

The μA7912QB 3-Terminal Negative Voltage Regulator is constructed using the Fairchild Planar Epitaxial process. This negative regulator is intended as a complement to the popular μA7812QB Positive Voltage Regulator. The μA7912QB employs internal current-limiting, safe-area protection, and thermal shutdown, making it virtually indestructible.[6]

- **Output Current In Excess Of 1 A**
- **Internal Thermal Overload Protection**
- **Internal Short Circuit Current-Limiting**
- **Output Transistor Safe-Area Compensation**

Connection Diagram
2-Lead TO-3 Can
(Top View)



Order Information

Part No.	Case/ Finish	Package Code MIl-M-38510, Appendix C
μA7912KMQB	YC	2-Lead Can

JAN Product Available

11506	BYA	2-Lead Can
11506	BYC	2-Lead Can

Absolute Maximum Ratings

Storage Temperature Range	-65°C to +175°C
Operating Temperature Range	-55°C to +125°C
Lead Temperature (soldering, 60 s)	300°C
Internal Power Dissipation[9]	
Can Without Heat Sink[10]	0.71 W
Can With Heat Sink[11]	5.6 W
Input Voltage	-35 V

Notes
1. 100% Test and Group A
2. Group A
3. Periodic tests, Group C
4. Guaranteed but not tested
5. When changes occur, FSC will make data sheet revisions available. Contact local sales representative for the latest revision.
6. For more information on device function, refer to the Fairchild Linear Data Book Commercial Section.
7. All characteristics except line and load transient response and noise are measured using pulse techniques ($t_W \leq 10$ ms, duty cycle $\leq 5\%$). Output voltage changes due to changes in the internal temperature must be taken into account separately.
8. Conditions given will result in the following: $P_D \leq 15$ W.
9. Internally limited.
10. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 35°C/W.
11. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 4.46°C/W.

Processing: MIL-STD-883, Method 5004

Burn-In: Method 1015, Condition A, PDA calculated using Method 5005, Subgroup 1

Quality Conformance Inspection: MIL-STD-883, Method 5005

Group A Electrical Tests Subgroups:
1. Static tests at 25°C
2. Static tests at 125°C
3. Static tests at -55°C
4. Dynamic tests at 25°C
5. Dynamic tests at 125°C
6. Dynamic tests at −55°C
9. AC tests at 25°C

Group C and D Endpoints: Group A, Subgroup 1

μA7912QB
Electrical Characteristics $V_I = -19$ V, $I_L = 500$ mA, $C_I = 2.0$ μF, $C_O = 1.0$ μF, unless otherwise specified.[7]

Symbol	Characteristic	Condition		Min	Max	Unit	Note	Subgrp
V_O	Output Voltage[8]			-12.5	-11.5	V	1	1
		$5.0\ mA \leq I_L \leq 1.0\ A$	$V_I = -15.5$ V	-12.6	-11.4	V	1	1,2,3
			$V_I = -27$ V	-12.6	-11.4	V	1	1,2,3
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_L = 5.0$ mA, $25°C \leq T_A \leq 125°C$			3.6	mV/°C	4	2
		$I_L = 5.0$ mA, $-55°C \leq T_A \leq 25°C$			3.6	mV/°C	4	3
$V_{R\ LINE}$	Line Regulation	$-30\ V \leq V_I \leq -14.5\ V$			120	mV	1	1
		$-30\ V \leq V_I \leq -15\ V$			120	mV	1	2,3
		$-22\ V \leq V_I \leq -16\ V$			60	mV	1	1
					90	mV	1	2,3
$V_{R\ LOAD}$	Load Regulation	$5.0\ mA \leq I_L \leq 1.5\ A$			120	mV	1	1
					240	mV	1	2,3
		$250\ mA \leq I_L \leq 750\ mA$			84	mV	1	1
					160	mV	1	2,3
I_{SCD}	Standby Current Drain				2.0	mA	1	1
					3.0	mA	1	2,3
ΔI_{SCD} (LINE)	Standby Current Drain Change (vs Line Voltage)	$-30\ V \leq V_I \leq -15\ V$			1.0	mA	1	1,2,3
ΔI_{SCD} (LOAD)	Standby Current Drain Change (vs Load Current)	$5.0\ mA \leq I_L \leq 1.0\ A$			0.5	mA	1	1,2,3
V_{DO}	Dropout Voltage	$I_L = 1.0$ A			2.3	V	1	1
I_{OS}	Short Circuit Current	$V_I = -35$ V			2.0	A	1	1,2,3
I_{pk}	Peak Output Current	$V_I = -15$ V, $\Delta V_O = 1.13$ V		1.0	4.0	A	1	1,2,3
V_{RTH}	Thermal Regulation	$V_I = -22$ V, $I_L = 1.0$ A			120	mV	1	1
V_{START}	Voltage Start	$V_I = -27$ V, $R_L = 12\ \Omega$		-12.6	-11.4	V	1	1,2,3
$\Delta V_I/\Delta V_O$	Ripple Rejection	$V_I = -17$ V, $I_L = 350$ mA, $e_i = 1.0\ V_{rms}$, f = 2400 Hz		50		dB	1	4,5,6
N_O	Noise	$V_I = -17$ V, $I_L = 100$ mA, $10\ Hz \leq f \leq 10\ kHz$			600	μV_{rms}	4	9
$\Delta V_O/\Delta V_I$	Line Transient Response	$V_I = -17$ V, $I_L = 5.0$ mA, $V_{pulse} = -3.0$ V			30	mV/V	4	9
$\Delta V_O/\Delta I_L$	Load Transient Response	$V_I = -17$ V, $I_L = 100$ mA, $\Delta I_L = 400$ mA			2.5	mV/mA	4	9

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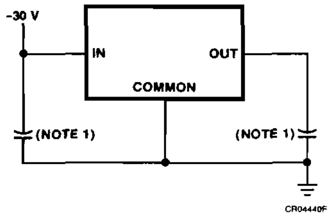
Primary Burn-In Circuit

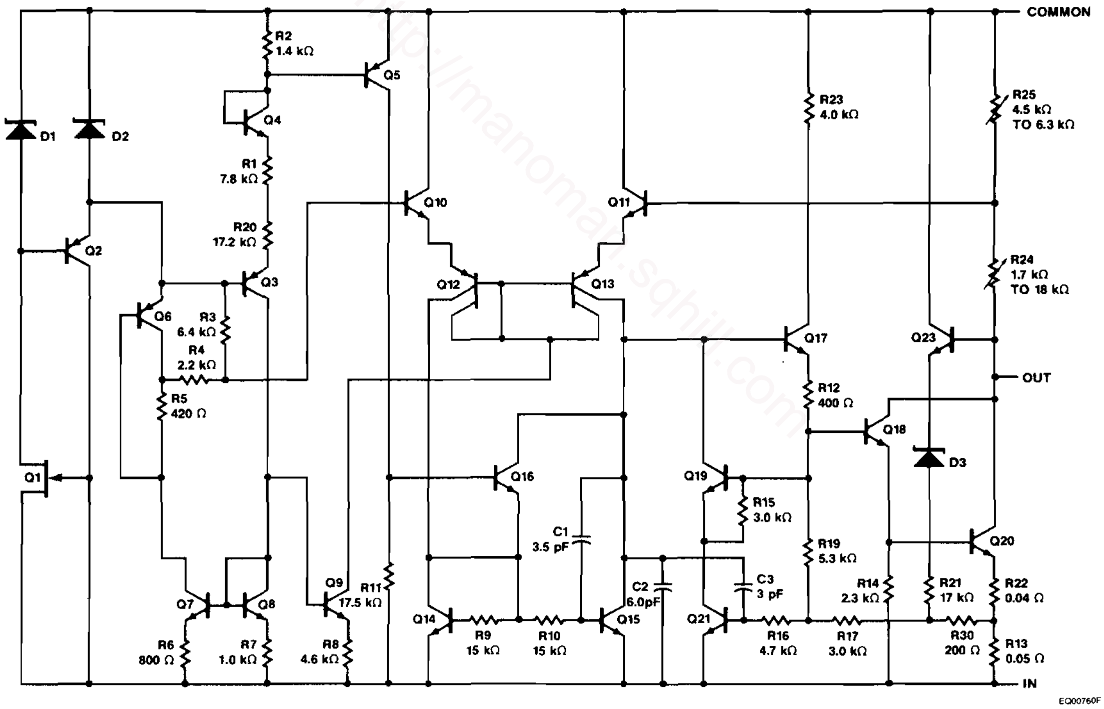
(38510/11506 may be used by FSC as an alternate)



Note

1. Capacitor value necessary to suppress oscillations.

Equivalent Circuit



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MIL-STD-883
July 1986—Rev 1[5]

μA7915QB 3-Terminal Negative Voltage Regulator

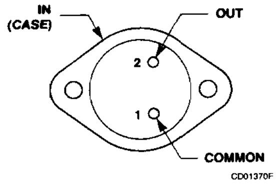
Aerospace and Defense Data Sheet
Linear Products

Description

The μA7915QB 3-Terminal Negative Voltage Regulator is constructed using the Fairchild Planar Epitaxial process. This negative regulator is intended as a complement to the popular μA7815QB Positive Voltage Regulator. The μA7915QB employs internal current-limiting, safe-area protection, and thermal shutdown, making it virtually indestructible.[6]

- **Output Current In Excess Of 1 A**
- **Internal Thermal Overload Protection**
- **Internal Short Circuit Current-Limiting**
- **Output Transistor Safe-Area Compensation**

Connection Diagram 2-Lead TO-3 Can (Top View)



Order Information

Part No.	Case/ Finish	Package Code Mil-M-38510, Appendix C
μA7915KMQB	YC	2-Lead Can

JAN Product Available

11507	BYA	2-Lead Can
11507	BYC	2-Lead Can

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Absolute Maximum Ratings

Storage Temperature Range	-65°C to +175°C
Operating Temperature Range	-55°C to +125°C
Lead Temperature (soldering, 60 s)	300°C
Internal Power Dissipation[9]	
Can Without Heat Sink[10]	0.71 W
Can With Heat Sink[11]	5.6 W
Input Voltage	-35 V

Notes
1. 100% Test and Group A
2. Group A
3. Periodic tests, Group C
4. Guaranteed but not tested
5. When changes occur, FSC will make data sheet revisions available. Contact local sales representative for the latest revision.
6. For more information on device function, refer to the Fairchild Linear Data Book Commercial Section.
7. All characteristics except line and load transient response and noise are measured using pulse techniques ($t_W \leq 10$ ms, duty cycle $\leq 5\%$). Output voltage changes due to changes in the internal temperature must be taken into account separately.
8. Conditions given will result in the following: $P_D \leq 15$ W.
9. Internally limited.
10. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 35°C/W.
11. Rating applies to ambient temperatures up to 125°C. Above 125°C, derate linearly at 4.46°C/W.

Processing: MIL-STD-883, Method 5004

Burn-In: Method 1015, Condition A, PDA calculated using Method 5005, Subgroup 1

Quality Conformance Inspection: MIL-STD-883, Method 5005

Group A Electrical Tests Subgroups:
1. Static tests at 25°C
2. Static tests at 125°C
3. Static tests at -55°C
4. Dynamic tests at 25°C
5. Dynamic tests at 125°C
6. Dynamic tests at -55°C
9. AC tests at 25°C

Group C and D Endpoints: Group A, Subgroup 1

μA7915QB*

Electrical Characteristics $V_I = -23$ V, $I_L = 500$ mA, $C_I = 2.0$ μF, $C_O = 1.0$ μF, unless otherwise specified.[7]

Symbol	Characteristic	Condition		Min	Max	Unit	Note	Subgrp
V_O	Output Voltage[8]			−15.6	−14.4	V	1	1
		$5.0 \text{ mA} \leq I_L \leq 1.0 \text{ A}$	$V_I = -18.5$ V	−15.75	−14.25	V	1	1,2,3
			$V_I = -30$ V	−15.75	−14.25	V	1	1,2,3
$\Delta V_O/\Delta T$	Average Temperature Coefficient of Output Voltage	$I_L = 5.0$ mA, $25°C \leq T_A \leq 125°C$			4.5	mV/°C	4	2
		$I_L = 5.0$ mA, $-55°C \leq T_A \leq 25°C$			4.5	mV/°C	4	3
$V_{R\ LINE}$	Line Regulation	$-30 \text{ V} \leq V_I \leq -17.5 \text{ V}$			150	mV	1	1
		$-30 \text{ V} \leq V_I \leq -18.5 \text{ V}$			150	mV	1	2,3
		$-26 \text{ V} \leq V_I \leq -20 \text{ V}$			75	mV	1	1
					120	mV	1	2,3
$V_{R\ LOAD}$	Load Regulation	$5.0 \text{ mA} \leq I_L \leq 1.5 \text{ A}$			150	mV	1	1
					300	mV	1	2,3
		$250 \text{ mA} \leq I_L \leq 750 \text{ mA}$			105	mV	1	1
					180	mV	1	2,3
I_{SCD}	Standby Current Drain				2.0	mA	1	1
					3.0	mA	1	2,3
ΔI_{SCD} (LINE)	Standby Current Drain Change (vs Line Voltage)	$-30 \text{ V} \leq V_I \leq -18.5 \text{ V}$			1.0	mA	1	1,2,3
ΔI_{SCD} (LOAD)	Standby Current Drain Change (vs Load Current)	$5.0 \text{ mA} \leq I_L \leq 1.0 \text{ A}$			0.5	mA	1	1,2,3
V_{DO}	Dropout Voltage	$I_L = 1.0$ A			2.3	V	1	1
I_{OS}	Short Circuit Current	$V_I = -35$ V			2.0	A	1	1,2,3
I_{pk}	Peak Output Current	$V_I = -18.5$ V, $\Delta V_O = 1.43$ V		1.0	4.0	A	1	1,2,3
V_{RTH}	Thermal Regulation	$V_I = -25$ V, $I_L = 1.0$ A			150	mV	1	1
V_{START}	Voltage Start	$V_I = -30$ V, $R_L = 15$ Ω		−15.75	−14.25	V	1	1,2,3
$\Delta V_I/\Delta V_O$	Ripple Rejection	$V_I = -20$ V, $I_L = 350$ mA, $e_i = 1.0$ V_{rms}, $f = 2400$ Hz		50		dB	1	4,5,6
N_O	Noise	$V_I = -20$ V, $I_L = 100$ mA, $10 \text{ Hz} \leq f \leq 10 \text{ kHz}$			700	μV_{rms}	4	9
$\Delta V_O/\Delta V_I$	Line Transient Response	$V_I = -20$ V, $I_L = 5.0$ mA, $V_{pulse} = -3.0$ V			30	mV/V	4	9
$\Delta V_O/\Delta I_L$	Load Transient Response	$V_I = -20$ V, $I_L = 100$ mA, $\Delta I_L = 400$ mA			2.5	mV/mA	4	9

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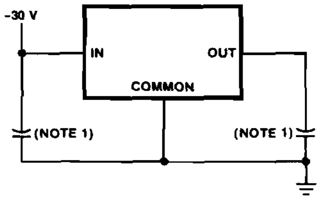
Primary Burn-In Circuit
(38510/11507 may be used by FSC as an alternate)



Note
1. Capacitor value necessary to suppress oscillations.

Equivalent Circuit