

1.0 SCOPE

This specification covers the detail requirements for a precision JFET operational amplifier.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace spec control drawings.

1.2 Part Number. The complete part numbers per Table I of this specification follow:

<u>Device</u>	<u>Part Number</u>	<u>Package</u>
A	OP-16AJ/883	J
B	OP-16BJ/883	J
B	OP-16BZ/883	Z
C	OP-16CZ/883	Z

1.2.3 Case Outline.

<u>Letter</u>	<u>Case Outline (Lead finish per MIL-M-38510)</u>
J	8-lead metal can (TO-99)
Z	8-lead ceramic dual-in-line package (CERDIP)

1.3 Absolute Maximum Ratings. ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Supply Voltage.....	$\pm 22\text{V}$
C Grade Only	$\pm 18\text{V}$
Internal Power Dissipation	500mW
Maximum Junction Temperature	$+150^\circ\text{C}$
DICE Junction Temperature Range (T_J)	-65°C to $+150^\circ\text{C}$
Differential Input Voltage.....	$\pm 40\text{V}$
C Grade Only	$\pm 30\text{V}$
Input Voltage (Note 1)	$\pm 20\text{V}$
C Grade Only	$\pm 16\text{V}$
Output Short-Circuit Duration	Indefinite
Storage Temperature Range.....	-65°C to $+150^\circ\text{C}$
Lead Temperature (Soldering, 60 sec).....	$+300^\circ\text{C}$
Operating Temperature Range	-55°C to $+125^\circ\text{C}$

NOTES:

- For supply voltages less than $\pm 22\text{V}$, the absolute maximum input voltage is equal to the supply voltages.

1.5 Thermal Characteristics:

Thermal Resistance, TO-99 (J) package:

Junction-to-Case (θ_{JC}) = 45°C/W MAX

Junction-to-Ambient (θ_{JA}) = 150°C/W MAX

Thermal Resistance, CERDIP (Z) package:

Junction-to-Case (θ_{JC}) = 26°C/W MAX

Junction-to-Ambient (θ_{JA}) = 119°C/W MAX

TABLE 1

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = 25^\circ C$ unless otherwise specified.

OP-16/883							
Characteristics	Symbol	Special Conditions	LIMITS A		LIMITS B		Units
			Min	Max	Min	Max	
Input Offset Voltage	V _{OS}		—	0.5	—	1.0	mV
		-55°C ≤ T _A ≤ +125°C	—	0.9	—	2.0	mV
Input Offset Current	I _{OS}	V _S = ±20V, T _J = +25°C	—	10.0	—	20.0	pA
		V _S = ±20V, T _J = +125°C	—	4.0	—	6.0	nA
Input Bias Current	I _B	V _S = ±20V, T _J = +25°C	—	±50.0	—	±100.0	pA
		V _S = ±20V, T _J = +125°C	—	±5.0	—	±7.5	nA
Large-Signal Voltage Gain	A _{VO}	V _O = ±10V, R _L ≥ 2kΩ	100.0	—	75.0	—	V/mV
		V _O = ±10V, R _L ≥ 2kΩ	35.0	—	30.0	—	V/mV
		-55°C ≤ T _A ≤ +125°C					
Output Voltage Swing	V _O	R _L ≥ 2kΩ	±11.0	—	±11.0	—	V
		R _L ≥ 10kΩ	±12.0	—	±12.0	—	V
		-55°C ≤ T _A ≤ +125°C					
Supply Current	I _{SY}	V _O = 0V	—	7.0	—	7.0	mA
Power Dissipation	P _d	V _O = 0V	—	210	—	210	mW
Slew Rate	SR	A _{VCL} = +1 R _L ≥ 2kΩ, C _L = 100pF	18.0	—	12.0	—	V/μs
Common-Mode Rejection	CMR	V _{CM} = I _{VR} = ±10.5V	86	—	86	—	dB
		V _{CM} = I _{VR} = ±10.4V	85	—	85	—	dB
		-55°C ≤ T _A ≤ +125°C					
Power Supply Rejection	PSR	V _S = ±10V to ±18V	86	—	86	—	dB
		V _S = ±10V to ±18V	85	—	85	—	dB
		-55°C ≤ T _A ≤ +125°C					
Input Voltage Range (Note 1)	I _{VR}		±10.5	—	±10.5	—	V
		-55°C ≤ T _A ≤ +125°C	±10.4	—	±10.4	—	V

TABLE 1 (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = 25^\circ C$ unless otherwise specified.

OP-16/883							
Characteristics	Symbol	Special Conditions	LIMITS A		LIMITS B		Units
			Min	Max	Min	Max	
Gain Bandwidth Product	GBW	f _O = 100kHz	6.0	—	5.5	—	MHz

NOTES:

1. IVR is defined as the V_{CM} range used for the CMR test.

TABLE 1 (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = 25^\circ C$ unless otherwise specified.

			OP-16/883		
Characteristics	Symbol	Special Conditions	LIMITS C		Units
			Min	Max	
Input Offset Voltage	V _{OS}		—	3.0	mV
		-55°C ≤ T _A ≤ +125°C	—	4.5	mV
Input Offset Current	I _{OS}	V _S = ±20V, T _J = +25°C	—	50.0	pA
		V _S = ±20V, T _J = +125°C	—	9.0	nA
Input Bias Current	I _B	V _S = ±20V, T _J = +25°C	—	±200.0	pA
		V _S = ±20V, T _J = +125°C	—	±10.0	nA
Large-Signal Voltage Gain	A _{VO}	V _O = ±10V, R _L ≥ 2kΩ	50.0	—	V/mV
		V _O = ±10V, R _L ≥ 2kΩ	25.0	—	V/mV
		-55°C ≤ T _A ≤ +125°C			
Output Voltage Swing	V _O	R _L ≥ 2kΩ	±11.0	—	V
		R _L ≥ 10kΩ	±12.0	—	V
		-55°C ≤ T _A ≤ +125°C			
Supply Current	I _{SY}	V _O = 0V	—	8.0	mA
Power Dissipation	P _d	V _O = 0V	—	240	mW
Slew Rate	SR	A _{VCL} = +1 R _L ≥ 2kΩ, C _L = 100pF	9.0	—	V/μs
Common-Mode Rejection	CMR	V _{CM} = IVR = ±10.3V	82	—	dB
		V _{CM} = IVR = ±10.25V	80	—	dB
		-55°C ≤ T _A ≤ +125°C			
Power Supply Rejection	PSR	V _S = ±10V to ±15V	82	—	dB
		V _S = ±10V to ±15V	80	—	dB
		-55°C ≤ T _A ≤ +125°C			

TABLE 1 (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = 25^\circ C$ unless otherwise specified.

			OP-16/883		
Characteristics	Symbol	Special Conditions	LIMITS C		Units
			Min	Max	
Input Voltage Range (Note 1)	IVR		±10.3	—	V
		-55°C ≤ T _A ≤ +125°C	±10.25	—	V
Gain Bandwidth Product	GBW	f _O = 100kHz	5	—	MHz

NOTES:

1. IVR is defined as the V_{CM} range used for the CMR test.

TABLE 2

OP-16/883

**Electrical Test Requirements
For Class B Devices**

MIL-STD-883 Test Requirements	Subgroups (see Table 3)
Interim Electrical Parameters (pre Burn-In)	1
Final Electrical Test Parameters	1*, 2, 3, 4, 5, 6
Group A Test Requirements	1, 2, 3, 4, 5, 6, 7

- * PDA applies to Subgroup 1 only.
For "A" grade product, V_{OS} and I_{OS} are excluded from PDA.
For "B" grade product, V_{OS} is excluded from PDA.

TABLE 3**Group A Inspection** $V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = T_J$ unless otherwise specified.

OP-16/883							
Subgroup	Symbol	Special Conditions	LIMITS A		LIMITS B		Units
			Min	Max	Min	Max	
Subgroup 1	V _{OS}		--	0.5	--	1.0	mV
T _A = +25°C	I _{OS}	V _S = ±20V	--	10.0	--	20.0	pA
	I _B	V _S = ±20V	--	±50.0	--	±100.0	pA
	I _{SY}		--	7.0	--	7.0	mA
	CMR	V _{CM} = ±10.5V	86	--	86	--	dB
	PSR	V _S = ±10V, ±18V	86	--	86	--	dB
Subgroup 2	V _{OS}		--	0.9	--	2.0	mV
T _A = +125°C	I _{OS}	V _S = ±20V	--	4.0	--	6.0	nA
	I _B	V _S = ±20V	--	±5.0	--	±7.5	nA
	CMR	V _{CM} = ±10.4V	85	--	85	--	dB
	PSR	V _S = ±10V, ±18V	85	--	85	--	dB
	Subgroup 3	V _{OS}		--	0.9	--	2.0
T _A = -55°C	CMR	V _{CM} = ±10.4V	85	--	85	--	dB
	PSR	V _S = ±10V, ±18V	85	--	85	--	dB
Subgroup 4	V _O	R _L = 2kΩ	±11.0	--	±11.0	--	V
T _A = +25°C	A _{VO}	V _O = ±10V, R _L = 2kΩ	100.0	--	75.0	--	V/mV
Subgroup 5	V _O	R _L = 10kΩ	±12.0	--	±12.0	--	V
T _A = +125°C	A _{VO}	V _O = ±10V, R _L = 2kΩ	35.0	--	30.0	--	V/mV

TABLE 3

Group A Inspection (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = T_J$ unless otherwise specified.

OP-16/883							
Subgroup	Symbol	Special Conditions	<u>LIMITS A</u>		<u>LIMITS B</u>		Units
			Min	Max	Min	Max	
Subgroup 6		All Tests, Limits and Conditions are the same as for Subgroup 5.					
T _A = -55°C							
Subgroup 7	SR	A _{VCL} = +1 R _L = 2k Ω , C _L = 100pF	18.0	—	12.0	—	V/ μ s
T _A = +25°C	GBW	f _O = 100kHz	6	—	5.5	—	MHz

TABLE 3

Group A Inspection (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = T_J$ unless otherwise specified.

OP-16/883					
Subgroup	Symbol	Special Conditions	LIMITS C		Units
			Min	Max	
Subgroup 1 $T_A = +25^{\circ}C$	V_{OS}		–	3.0	mV
	I_{OS}	$V_S = \pm 20V$	--	50.0	pA
	I_B	$V_S = \pm 20V$	--	± 200.0	pA
	I_{SY}		–	8.0	mA
	CMR	$V_{CM} = \pm 10.3V$	82	–	dB
	PSR	$V_S = \pm 10V, \pm 15V$	82	–	dB
Subgroup 2 $T_A = +125^{\circ}C$	V_{OS}		–	4.5	mV
	I_{OS}	$V_S = \pm 20V$	–	9.0	nA
	I_B	$V_S = \pm 20V$	–	± 10.0	nA
	CMR	$V_{CM} = \pm 10.25V$	80	--	dB
	PSR	$V_S = \pm 10V, \pm 15V$	80	–	dB
	Subgroup 3 $T_A = -55^{\circ}C$	V_{OS}		–	4.5
CMR		$V_{CM} = \pm 10.25V$	80	–	dB
PSR		$V_S = \pm 10V, \pm 15V$	80	--	dB
Subgroup 4 $T_A = +25^{\circ}C$	V_O	$R_L = 2k\Omega$	± 11.0	--	V
	A_{VO}	$V_O = \pm 10V, R_L = 2k\Omega$	50.0	--	V/mV
Subgroup 5 $T_A = +125^{\circ}C$	V_O	$R_L = 10k\Omega$	± 12.0	--	V
	A_{VO}	$V_O = \pm 10V, R_L = 2k\Omega$	25.0	–	V/mV

TABLE 3

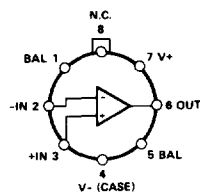
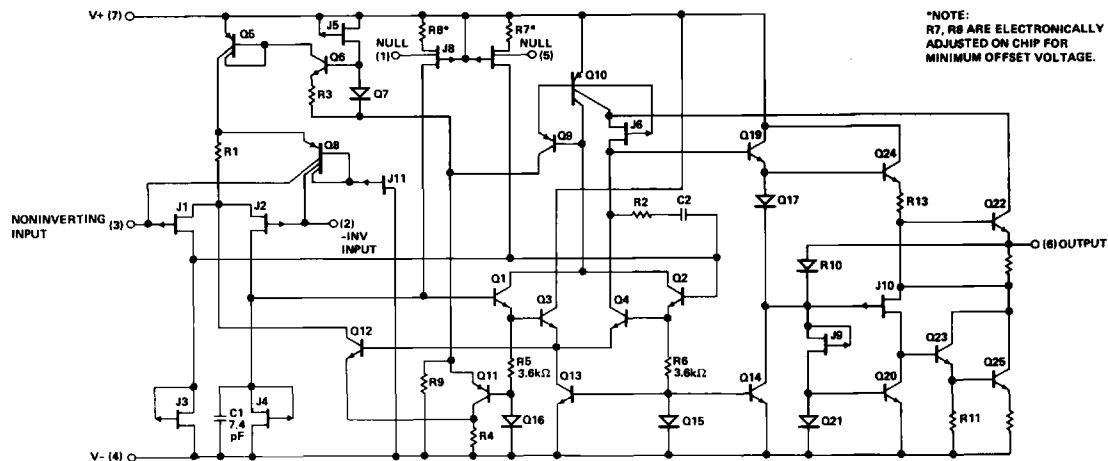
Group A Inspection (Continued)

$V_S = \pm 15V$; $R_S = 50\Omega$; $V_{CM} = 0V$; $T_A = T_J$ unless otherwise specified.

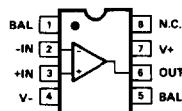
OP-16/883					
<u>LIMITS C</u>					
Subgroup	Symbol	Special Conditions	Min	Max	Units
Subgroup 6	All Tests, Limits and Conditions are the same as for Subgroup 5.				
$T_A = -55^{\circ}C$					
Subgroup 7	SR	$A_{VCL} = +1$ $R_L = 2k\Omega, C_L = 100pF$	9.0	—	V/ μs
$T_A = +25^{\circ}C$					
	GBW	$f_O = 100kHz$	5	—	MHz

OP-16

3.2.1 Simplified Schematic and Pin Connections.



TO-99
(J-Suffix)



8-PIN HERMETIC DIP
(Z-Suffix)

3.2.4 Microcircuit Group Assignment. This microcircuit is covered by microcircuit group 61.

4.2 Life Test/Burn-In Circuit.

