42750A FOUR (~ ~ ~ ~ ~					
	CHAN		OW N	OISE DC BIAS CARD		
Output Valta		Range 1 -8.192 V to +8.191 V	17	Range 2		
Output Volta Resolution:	ge:	-8.192 V to +8.191 V 1.00 mV	v	-16.384 V to +16.383 V 2.00 mV		
Output Noise		1.00 III v		2.00 m v		
1 Hz	•	$250 \text{ nV}/\sqrt{\text{Hz}}$		$350 \text{ nV}/\sqrt{\text{Hz}}$		
10 Hz		$75 \text{ nV}/\sqrt{\text{Hz}}$		$100 \text{ nV}/\sqrt{\text{Hz}}$		
100 Hz		$60 \text{ nV}/\sqrt{\text{Hz}}$		$75 \text{ nV}/\sqrt{\text{Hz}}$		
1 kHz		$50 \text{ nV}/\sqrt{\text{Hz}}$		$50 \text{ nV}/\sqrt{\text{Hz}}$		
10 kHz		$40 \text{ nV}/\sqrt{\text{Hz}}$		$40 \text{ nV}/\sqrt{\text{Hz}}$		
Accuracy:		0.1% of programme				
L	Output Current: ±100 mA max, 300 mA max per card					
		nit (Protection): ±12				
		$75 \text{ m}\Omega \text{ max. for I}_0 \leq$		mA.		
	Accur	put/Accuracy: 3 Ran		dina		
Range 1 mA		of reading $\pm 1 \mu\text{A}$	1 m	ding		
		of reading $\pm 10 \mu\text{A}$		nA/V		
		of reading $\pm 120 \mu\text{A}$		mA/V		
		ut/Accuracy: 2 Rang				
Range	Accur		-	ding		
10 V	0.25%	reading ±3 mV	1 V/	V		
20 V	0.25%	reading ±6 mV	100	mV/V		
42753 FOUR CI	H. BIP		E DC	BIAS CARD, ±25 V		
		Range 1	76 11	Range 2		
Output Volta Resolution:	ge:	-10.24 V to +10.238 1.25 mV	15 V	-25.01 V to +25.01 V 3.125 mV		
Output Noise		1.23 III V		5.125 IIIV		
1 Hz	•	$250 \text{ nV}/\sqrt{\text{Hz}}$		$450 \text{ nV}/\sqrt{\text{Hz}}$		
10 Hz		$75 \text{ nV}/\sqrt{\text{Hz}}$		$150 \text{ nV}/\sqrt{\text{Hz}}$		
100 Hz		$60 \text{ nV}/\sqrt{\text{Hz}}$		$100 \text{ nV}/\sqrt{\text{Hz}}$		
1 kHz		$50 \text{ nV}/\sqrt{\text{Hz}}$		$75 \text{ nV}/\sqrt{\text{Hz}}$		
10 kHz		$40 \text{ nV}/\sqrt{\text{Hz}}$		$50 \text{ nV}/\sqrt{\text{Hz}}$		
Accuracy:		0.1% of programme	d valu	e ±25 mV		
Output Curre	ent:	±100 mA max, 300 m	mA m	ax per card		
		nit (Protection): ±12				
		75 mΩ max. for $I_0 ≤$		mA.		
		out/Accuracy: 3 Ran				
Range 1 mA	Accur	·	Rea	-		
10 mA		of reading ±1 μA of reading ±10 μA	1 m/	nA/V		
100 mA		of reading $\pm 150 \mu\text{A}$		mA/V		
		ut/Accuracy: 2 Rang				
8						
Range	-	acy		ding		
Range 10 V	Accur			ding V		
	Accur 0.3%	reading ±3 mV reading ±6 mV	Rea 1 V/			
10 V 25 V	Accur 0.3% 1 0.3% 1	reading ±3 mV reading ±6 mV	Rea 1 V/ 100	V mV/V		
10 V 25 V	Accur 0.3% 1 0.3% 1	reading ±3 mV reading ±6 mV	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA		
10 V 25 V 42755 TWO CH	Accur 0.3% 1 0.3% 1	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2		
10 V 25 V 42755 TWO CH Output Volta	Accur 0.3% 1 0.3% 1	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V		
10 V 25 V 42755 TWO CH Output Volta Resolution:	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV		
10 V 25 V 42755 TWO CH Output Volta Resolution:	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV 400 nV/V <u>Hz</u>		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/VHz	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/\/Hz 75 nV/\/Hz	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV 400 nV/\ <u>Hz</u> 100 nV/\ <u>Hz</u>		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$	Rea 1 V/ 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV 400 nV/\Hz 100 nV/\Hz 75 nV/\Hz		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz	Accur 0.3% 1 0.3% 1 I. BIPC ge:	reading ±3 mV reading ±6 mV DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/√Hz 75 nV/√Hz 60 nV/√Hz 50 nV/√Hz	Rea 1 V/ 100 DC I 75 V	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV 400 nV/\/Hz 100 nV/\/Hz 50 nV/\/Hz 40 nV/\/Hz		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 100 Kz 1 kHz 10 kHz Accuracy: Output Curre	Accur 0.3% 1 0.3% 1 I. BIP(ge: ::	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 100 mA max, 300 max	Rea 1 V/ 100 DC I 75 V	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curry Output Curry	Accur 0.3% 1 0.3% 1 I. BIP(ge: :: ent: ent Lin	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $75 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 100 mA max, 300 m mit (Protection): ± 27	Rea 1 V/ 100 2 DC I 75 V d valu mA m 70 mA	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$		
10 V 25 V 42755 TWO CH Output Volta, Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curry Output Curry Output Resis	Accur 0.3% i 0.3% i I. BIPO ge: :: ent: ent Lin tance:	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $75 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 0.1% of programme $\pm 100 \text{ mA max}, 300 \text{ m}$ nit (Protection): ± 27 $75 \text{ m}\Omega \text{ max}. \text{ for } I_0 \leq 100$	Rea 1 V/ 100 C DC I 75 V d valu mA m 70 mA ≤ +75 t	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curro Output Curro Output Resis Current Sens	Accur 0.3% 1 0.3% 1 1. BIPC ge: :: ent: ent Lin tance: se Outp	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $75 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 100 mA max, 300 m nit (Protection): ± 27 $75 \text{ m}\Omega$ max. for I ₀ \leq put/Accuracy: 3 Ran	Rea 1 V/ 100 2 DC I 75 V d valu mA m 70 mA 5 +75 f ges:	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre Output Resis Current Sens Range	Accur 0.3% : 0.3% : 1. BIPC ge: :: ent: ent Lin tance: se Outj Accur	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $75 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 0.1% of programme $\pm 100 \text{ mA max}, 300 \text{ m}$ nit (Protection): ± 27 $75 \text{ m}\Omega \text{ max}$. for I _o \leq put/Accuracy: 3 Ran racy	Rea 1 V/ 100 2 DC I 75 V d valu mA m 70 mA 5 +75 1 ges: Rea	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 40		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre Output Resis Current Sens Range 1 mA	Accur 0.3% 1 0.3% 1 1. BIPC ge: :: ent: ent Lin tance: is Outp Accur 0.3% 0	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV $300 \text{ nV}/\sqrt{\text{Hz}}$ $75 \text{ nV}/\sqrt{\text{Hz}}$ $60 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ 0.1% of programme $\pm 100 \text{ mA max}, 300 \text{ m}$ nit (Protection): ± 27 $75 \text{ m}\Omega \text{ max}$. for I _o \leq put/Accuracy: 3 Ran racy of reading $\pm 1 \text{ µA}$	Rea 1 V/ 100 CDC I 75 V d valu mA m 70 mA 5 +75 1 ges: Rea 1 m.	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $e \pm 20 \text{ mV}$ ax per card max mA. ding A/V		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre Output Resis Current Sens Range 1 mA 10 mA	Accur 0.3% 1 0.3% 1 1. BIPC ge: :: ent: ent Lin tance: se Outp Accur 0.3% 0	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/ $\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$ 50 nV/ $\sqrt{\text{Hz}}$ 40 nV/ $\sqrt{\text{Hz}}$ 0.1% of programme. $\pm 100 \text{ mA max}$, 300 t init (Protection): ± 27 75 m Ω max. for I _o \leq put/Accuracy: 3 Ran racy of reading $\pm 1 \mu \text{A}$ of reading $\pm 10 \mu \text{A}$	Rea 1 V/ 100 CDC I 75 V d valu mA m 70 mA 5 +75 1 ges: Rea 1 m 10 n	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $e \pm 20 \text{ mV}$ ax per card max mA. ding A/V hA/V		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre	Accur 0.3% 1 0.3% 1 1. BIPC ge: :: ent: ent Lin tance: se Outp Accur 0.3% 0 0.3% 0	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/ $\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$ 50 nV/ $\sqrt{\text{Hz}}$ 40 nV/ $\sqrt{\text{Hz}}$ 0.1% of programmed $\pm 100 \text{ mA max}$, 300 t mit (Protection): ± 27 75 m Ω max. for $I_0 \leq$ put/Accuracy: 3 Ran racy of reading $\pm 10 \mu$ A of reading $\pm 10 \mu$ A	Rea 1 V/ 100 CDC I 75 V d valu mA m 70 mA 5 +75 t ges: Rea 1 m 10 n 100	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $e \pm 20 \text{ mV}$ ax per card max mA. ding A/V		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre	Accur 0.3% 1 0.3% 1 1. BIPC ge: :: ent: ent Lin tance: se Outp 0.3% 0 0.3% 0 0.3% 0	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/ $\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$ 50 nV/ $\sqrt{\text{Hz}}$ 40 nV/ $\sqrt{\text{Hz}}$ 0.1% of programmed $\pm 100 \text{ mA max}$, 300 t mit (Protection): ± 27 75 m Ω max. for I ₀ \leq put/Accuracy: 3 Ran racy of reading $\pm 10 \text{ µA}$ of reading $\pm 10 \text{ µA}$ of reading $\pm 250 \text{ µA}$ ut/Accuracy: 2 Range	Rea 1 V/ 100 CDC I 75 V d valu mA m 70 mA 5 +75 t ges: Rea 1 m 10 n 100 2 m 2 m 2 m 2 m 2 m 2 m 2 m 2 m	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to ± 20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ 100 nV/		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 100 Hz 1 kHz 10 kHz Accuracy: Output Curre Output Curre	Accur 0.3% : 0.3% : 0.3% : I. BIP(ge: :: ent: ent Lin tance: tance: 0.3% (0.3% (reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/ $\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$ 50 nV/ $\sqrt{\text{Hz}}$ 40 nV/ $\sqrt{\text{Hz}}$ 0.1% of programmed $\pm 100 \text{ mA max}$, 300 t mit (Protection): ± 27 75 m Ω max. for I ₀ \leq put/Accuracy: 3 Ran racy of reading $\pm 10 \text{ µA}$ of reading $\pm 10 \text{ µA}$ of reading $\pm 250 \text{ µA}$ ut/Accuracy: 2 Range	Rea 1 V/ 100 CDC I 75 V d valu mA m 70 mA 5 +75 t ges: Rea 1 m 10 n 100 2 m 2 m 2 m 2 m 2 m 2 m 2 m 2 m	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $400 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\text$		
10 V 25 V 42755 TWO CH Output Volta Resolution: Output Noise 1 Hz 10 Hz 10 Hz 10 Hz 10 kHz Accuracy: Output Curre Output C	Accur 0.3% : 0.3% : 0.3% : I. BIP(ge: :: ent: ent: ent Lint tance: tance: tance: 0.3% : 0.3% :	reading $\pm 3 \text{ mV}$ reading $\pm 6 \text{ mV}$ DLAR LOW NOISE Range 1 -10.24 V to +10.238 1.25 mV 300 nV/ $\sqrt{\text{Hz}}$ 75 nV/ $\sqrt{\text{Hz}}$ 60 nV/ $\sqrt{\text{Hz}}$ 50 nV/ $\sqrt{\text{Hz}}$ 40 nV/ $\sqrt{\text{Hz}}$ 0.1% of programmed $\pm 100 \text{ mA max}$, 300 t nit (Protection): ± 27 75 mQ max. for I ₀ \leq put/Accuracy: 3 Ran racy of reading $\pm 10 \mu$ A of reading $\pm 10 \mu$ A of reading $\pm 250 \mu$ A ut/Accuracy: 2 Rang racy	Rea 1 V/ 100 C DC I 75 V d valu mA m 75 V d valu mA m 70 mA f 5 eres 8 ea 1 m. 100 100 100 100 100 100 100 10	V mV/V BIAS CARD, 250 mA Range 2 -20.00 V to +20.00 V 2.50 mV $400 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\sqrt{\text{Hz}}$ $50 \text{ nV}/\sqrt{\text{Hz}}$ $400 \text{ nV}/\sqrt{\text{Hz}}$ $40 \text{ nV}/\sqrt{\text{Hz}}$ $100 \text{ nV}/\text$		

42757 FOUR C	H., BIPO	LAR LOW NOIS	E DC BIAS CAR	D, +36 V	
		ange 1	Range 2		
Output Volta		V to +10.23875 V	0 V to +35.8	84 V	
Resolution:	0.	625 mV	2.1875 mV		
Output Nois	e:				
1 Hz		$00 \text{ nV}/\sqrt{\text{Hz}}$	600 nV/ √ Hz	- Z	
10 Hz		$00 \text{ nV}/\sqrt{\text{Hz}}$	$250 \text{ nV}/\sqrt{\text{Hz}}$		
100 Hz		$5 \text{ nV}/\sqrt{\text{Hz}}$	$200 \text{ nV}/\sqrt{\text{Hz}}$	-	
1 kHz		nV/\sqrt{Hz}	$100 \text{ nV}/\sqrt{\text{Hz}}$	-	
10 kHz		nV/\sqrt{Hz}	$75 \text{ nV}/\sqrt{\text{Hz}}$	-	
Accuracy:		1% of programmed			
		0 mA max, 300 m.			
		(Protection): ±12			
		$5 \text{ m}\Omega \text{ max. for I}_{\Omega} \leq$			
		/Accuracy: 3 Rang			
	Accurac	•	-		
Range 1 mA			Reading		
10 mA		Freading $\pm 1.2 \mu A$			
		Freading $\pm 12 \mu A$			
100 mA		Freading $\pm 170 \mu A$			
0	-	Accuracy: 2 Rang			
Range	Accurac	•	Reading		
10 V		ading ±3 mV	1 V/V		
36 V	0.55% re	ading ±10 mV	100 mV/V		
PI-4002B-USB	INSTRU	MENT MAINFRA	ME		
Card Slots: I	Eight. Max	timum load determ	ined by card mix.		
		31 VDC, +10 VDC			
Dimensions:	7.0" H x 1	17.5" W x 19.625"	D.		
Weight: 15 lt	os.				
Temperature	e: 0° C to 5	50° C.			
I/V Sense Ou	itput: BN	C connector isolate	d from chassis gro	ound	
	~ ~ ~ ~ ~ ~ ~ ~				
		R MAINFRAME			
Output Com	iectors: F	our. Maximum load	d determined by ca	rd mix.	
		17.5" W x 26.0" D.	Allow 29.0" D for	cables.	
Weight: 85 lb					
Standard Ou	tput Volt	ages/Current:			
+31 VDC,					
-31 VDC,					
+12 VDC,					
+12 VDC,					
		ges/Current:			
		onal +36 V, 1.8 A o			
		onal +48 V, 1.8 A o	output for PI-4275	57	
AC Input Vo					
		25 VAC input			
		250 VAC input			
		% (0 to 100% full			
Line Regulation: 0.2% (20% line change)					
Noise and Ripple: 0.1% peak to peak					
		ess than 50 msec fo		•	
Temperature Coefficient: ±0.01%/°C maximum					
Stability: ±0.1% maximum for 24 hours after warm-up					
SPECIAL ORD		DELS:			

• 45101, High-Current CCD driver cards with 10 Ω output impedance

Compatibility:

Older 4000 Series equipment may contain a PI-4001 Control Mainframe, which is no longer available or supported. The PI-4001 can be replaced by a USB-equipped PC if all existing PI-4002/PI-4002A mainframes are upgraded with USB Opto control cards.

Nearly all existing driver and bias cards are supported by the new controllers, with the exception of the 40480 Clock Driver Card and 40770 Four-Quadrant Bias Card.

Revised 03/31/15. Specifications subject to change without notice.



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Features:

- Low-Noise Design
- Modular and Upgradable
- · High Precision and Accuracy
- Programmable Voltages, T_{p}/T_{r} , and Voltage Limits
- Bias Voltages from -25 to +36 V
- Clock Rates up to 100 MHz
- Voltage-sense and Current-sense outputs
- Backward Compatible

Applications:

- CCD Characterization and Test
- FPA Characterization and Test
- · CMOS Imager Characterization and Test

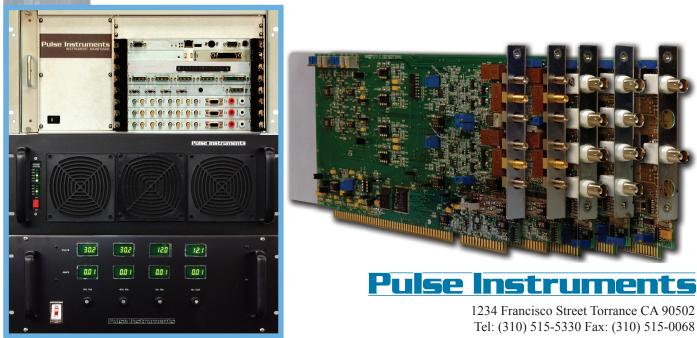
Introduction:

The PI-4000 Series represents a no-compromises approach to providing low-noise, flexible stimulus for the test and characterization of high-performance CCDs, IR FPAs, and CMOS Image Sensors. In conjunction with Pulse Instruments or third-party pattern generators, the 4000 Series can drive a wide variety of imaging devices in standard or non-standard operating modes.

This flexibility enables device designers, manufacturers, and integrators to test and optimize device performance under a wide range of operating conditions.

Instrument Description:

The PI-4000 Series comprises one or more PI-4002B Instrument Mainframes, one or more Clock Driver or DC Bias plug-in cards, and one PI-4003A DC Power Mainframe. It also requires a system controller, typically a USB-equipped PC or a CompactPCI mainframe with a single-board computer.





PI-4000 Series Low-Noise Clock Driver and DC Bias System

Each PI-4002B mainframe has 8 instrument card slots that can be populated with various combinations of clock driver and/or DC Bias cards.

Low-noise, linear DC power is supplied by the PI-4003A DC Power Mainframe, which can power up to three PI-4002B Instrument Mainframes, depending on the specific card configuration.

Digital control is provided via optically-isolated USB. The PI-4000B mainframes are floating with respect to the control mainframe. This permits separation of the analog and digital domains in the system for maximum noise immunity.

The PI-4000 Series provides a host of device protection features, such as a Disconnect mode, separate programmable voltage on/off sequencing, programmable voltage limits, and programmable current limits (selected models). There is also protection against transients that could damage the DUT. A reset feature also sets all output voltages throughout the system to 0 V in the event that any channel loses power.

Software Description:

The PI-4000 Series can be programmed via PI-Controller, PI-DATS, or by a custom application using the fully-documented ASCII command set.

PI-Controller and PI-DATS are Pulse Instruments' GUIbased test and characterization applications. Custom applications can program the instrument cards by passing ASCII commands to the controller by DLL or via GPIB. The ASCII command set is backward compatible with that used to program the older PI-4001 Control Mainframe.

SPECIFICATIONS: 42460 TWO CHANNEL DRIVER CARD **Output Characteristics:** (3' RG58C/U) $1 \text{ M}\Omega \text{ load}//15 \text{ pf}$ 50 $\Omega \text{ Load}$ Max. Repetition Rate 1: 16 MHz @20 V_w Max. Repetition Rate 2: 32 MHz @10 V High Level: -18 V to +20 V -9 V to +10 V -10 V to +9 V Low Level: -20 V to +18 V **Resolution:** 10 mV 5 mV 0.1 % of Prog. value 5% of Prog. value Accuracy*: ±100 mV ±50 mV 0.25 V to 11 V **Amplitude:** 0.5 V to 22 V $T_{\rm p}/\bar{T}_{\rm F}$ (@20 V_{pp}): 20-200 ns $(\pm 10\% \pm 5 \text{ ns})$ * for positive-going transition time set to minimum; may increase to 125 mV max. for transition times > minimum value (into 1 M Ω) **Output Polarity:** Normal or inverted, programmable **Output Resistance:** 50 $\Omega \pm 10\%$. **Output Noise:** 1 Hz $3.5 \,\mu\text{V}/\sqrt{\text{Hz}}$ $900 \text{ nV}/\sqrt{\text{Hz}}$ 10 Hz 100 HZ $400 \text{ nV}/\sqrt{\text{Hz}}$ $300 \text{ nV}/\sqrt{\text{Hz}}$ 1 kHz Clock Output: SMA Connector, isolated from chassis ground. **TTL Input**: Connector: SMA, isolated from chassis ground **Input Resistance:** 50 Ω or 500 $\Omega \pm 10\%$, programmable Input V_m: 3 to 5 V **Optically Isolated Input:** Connector: SMA, isolated from chassis ground **Input Impedance:** 300 Ω in series with LED Input V_{III}: 3 V to 5 V Minimum Pulse Width: 25 ns Max Clock Rate: 20 MHz Current Sense Output/Accuracy: 3 Ranges: Range Accuracy Reading 2.5% of reading $\pm 3 \,\mu A$ 1 mA/V 2 mA 2.5% of reading $\pm 30 \,\mu\text{A}$ 10 mA/V 20 mA 200 mA 2.5% of reading ±300 µA 25 mA/V Voltage Sense Output/Accuracy: 2 Ranges: Reading Range Accuracy 0.5% reading ±4 mV 10 V 1 V/V 20 V 0.5% reading ± 30 mV 100 mV/V 42465 SINGLE CHANNEL TRI-LEVEL DRIVER CARD Operating Modes: Two-level, Tri-Level, or Four-Level Output Characteristics: (3' RG58C/U) $1 \text{ M}\Omega \text{ load}//15 \text{ pf}$ 50 Ω Load Max. Repetition Rate 1: 16 MHz @20 V_{pp} -19 V to +20 V -9.5 V to +10 V High Level: -10 V to +9.5 V Low Level: -20 V to +19 V Tri Level: -10 V to +10 V -5 V to +5 V Resolution: 10 mV 5 mV 0.3 % of Prog. value 5% of Prog. value Accuracy*: ±100 mV ±50 mV 1 V to 22 V 0.5 V to 11 V Amplitude: T_{p}/T_{F} (@20 V_{pp}): 20-200 ns $(\pm 10\% \pm 5 \text{ ns})$ **Operating Conditions:** HLV-LLV > 1.0 V, LLV < MLLV < MHLV < HLV, $-10 \text{ V} \le \text{MLLV} \le \text{MHLV} \le +10 \text{ V}$ Output Polarity: Normal or inverted, programmable **Output Resistance:** 50 $\Omega \pm 10\%$. Clock Output: SMA Connector, isolated from chassis ground. TTL Inputs: Connector: SMA, isolated from chassis ground **Input Resistance:** 50 Ω or 500 $\Omega \pm 10\%$, programmable Input V_{HI}: 3 V to 5 V **Optically Isolated Inputs:** Connector: SMA, isolated from chassis ground **Input Impedance:** 300 Ω in series with LED Input V_m: 3 V to 5 V Minimum Pulse Width: 25 ns Max Clock Rate: 20 MHz

Current Sense Output/Accuracy: 3 Ranges: Range Accuracy Reading 2 mA 2.5% of reading $\pm 3 \mu A$ 1 mA/V 2.5% of reading $\pm 30 \ \mu A$ 10 mA/V 20 mA 200 mA 2.5% of reading ±300 µA 25 mA/V Voltage Sense Output/Accuracy: 2 Ranges: Reading Range Accuracy 0.5% reading ±4 mV 1 V/V 10 V 0.5% reading ±30 mV 100 mV/V 20 V 42490 TWO CHANNEL HIGH SPEED DRIVER CARD **Output Characteristics: (3' RG58C/U)** $1 \text{ M}\Omega \log d//15 \text{ pf}$ 50 $\Omega \text{ Load}$ Max. Repetition Rate 1: 70 MHz @ $10 V_{pp}$ 70 MHz @ $5 V_{pp}$ (Input Duty Cycle = 50%) Max. Repetition Rate 2: 100 MHz @16 V_{pp} 100 MHz @ 8 V_{pp} (Input Duty Cycle \neq 50%) -7 V to +17 V -3.5 V to +7.5 V High Level: Low Level: -17 V to +7 V -7.5 V to +3.5 V **Resolution:** 10 mV 5 mV 0.1 % of Prog. value 5% of Prog. value Accuracy: ±100 mV ±50 mV 0.5 V to 9.5 V Amplitude: 1 V to 18 V **Rise and Fall Times:** <5 ns @ 10 V.... <3.5 ns @ 5 V.... <7 ns @ 15 V **Operating Conditions:** HLV-LLV > 1 V **Output Aberrations**: 5% of V_{pp} +300 mV for V_{pp} > 2 V **Output Resistance:** 50 $\Omega \pm 10\%$ Output Polarity: Normal or Inverted, programmable **TTL Input**: Connector: SMA, isolated from chassis ground **Input Resistance:** 50 Ω or 500 $\Omega \pm 10\%$, programmable Input V_m: 3 to 5 V **Optically Isolated Input:** Connector: SMA, isolated from chassis ground **Input Impedance:** 300 Ω in series with LED Input V_{III}: 3 V to 5 V Minimum Pulse Width: 25 ns Max Clock Rate: 20 MHz Current Sense Output/Accuracy: 3 Ranges: Range Accuracy Reading 1 mA 2% of reading $\pm 3 \mu A$ 1 mA/V10 mA 2% of reading $\pm 30 \,\mu\text{A}$ 10 mA/V 100 mA 2.5% of reading ±300 µA 100 mA/V Voltage Sense Output/Accuracy: 2 Ranges: Accuracy Reading Range 0.2% reading ±20 mV 10 V 1 V/V 0.5% reading ±200 mV 20 V 100 mV/V Tek Run: 10.0GS/s ET Sample -1 ∆: 10.00 V @: 10.00 V C1 Freq 69.576MHz C1 Low -40mV C1 High 9.96 V C1 +Duty 48.2 % Ch1 2.00 V M 5.00ns Ch1 J 1.40 V 30 Jan 2008 14:23:13



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Current Sense Output/Accuracy: 3 Ranges:				
Range	Accuracy	Reading		
1 mA	0.25% of reading ±1 μA	1 mA/V		
10 mA	0.25% of reading ±10 µA	10 mA/V		
100 mA	0.25% of reading ±120 μA	100 mA/V		
Voltage Sense Output/Accuracy: 2 Ranges:				
Range	Accuracy	Reading		
10 V	0.25% reading ±3 mV	1 V/V		
20 V	0.25% reading +6 mV	100 mV/V		

