

Status List

HITACHI
Inspire the Next

HITACHI STANDARD LINEAR IC (Power Management Linear IC/
Multi-Purpose Linear IC)

Vol.16-4 2002.11



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Hitachi New Design IC "HA16150" Current Mode Push-Pull PWM Control IC

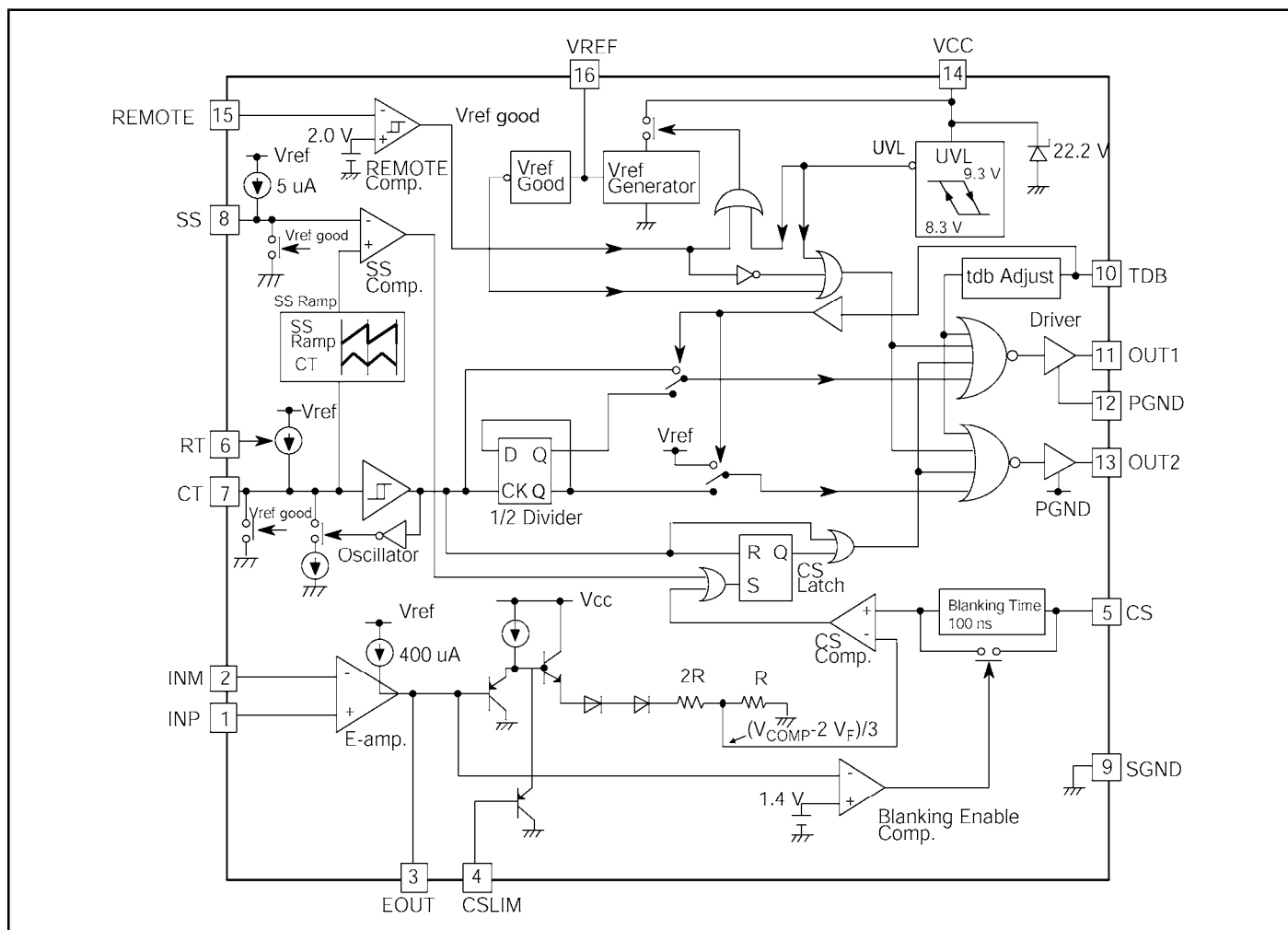
Features

- (1) Dead-band time adjustment function
- (2) Remote on/off function
- (3) Adjustable current limiter of power supply
- (4) Soft start function
- (5) Leading edge blanking for current sense
- (6) Switchover between push-pull / single-end
- (7) Package lineup: TSSOP-16, DILP-16

Characteristics

- (1) Absolute Maximum Ratings
 - Maximum power supply voltage: 20 V
 - Operation temperature: 40 to +105°C
- (2) Electrical Characteristics
 - UVLO start-up voltage: 9.3 V
 - UVLO shut-down voltage: 8.3 V
 - Maximum operation frequency (oscillator): 1 MHz
 - Reference output voltage: 5.0 V \pm 1%

Block Diagram



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Type No.	Package	P	Feature
HA17L431ALP	MPAK-5	5	Shunt Regulators
HA17L431ALTP	MPAK	5	Shunt Regulators
HA17L431AP	TO-92	5	Shunt Regulators
HA17L431LP	MPAK-5	5	Shunt Regulators
HA17L431P	TO-92	5	Shunt Regulators
HA17L431UP	UPAK	5	Shunt Regulators
HA17L432ALTP	MPAK	5	Shunt Regulators
HA17L432UP	UPAK	5	Shunt Regulators
HA178L02/A	TO-92MOD	6	Three-Terminal Regulators
HA178L02P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L02UA	UPAK	6	Three-Terminal Regulators
HA178L05/A	TO-92MOD	6	Three-Terminal Regulators
HA178L05NA	TO-92	6	Three-Terminal Regulators
HA178L05P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L05UA	UPAK	6	Three-Terminal Regulators
HA178L06/A	TO-92MOD	6	Three-Terminal Regulators
HA178L06P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L06UA	UPAK	6	Three-Terminal Regulators
HA178L08/A	TO-92MOD	6	Three-Terminal Regulators
HA178L08NA	TO-92	6	Three-Terminal Regulators
HA178L08P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L08UA	UPAK	6	Three-Terminal Regulators
HA178L09/A	TO-92MOD	6	Three-Terminal Regulators
HA178L09P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L09UA	UPAK	6	Three-Terminal Regulators
HA178L10/A	TO-92MOD	6	Three-Terminal Regulators
HA178L10P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L10UA	UPAK	6	Three-Terminal Regulators
HA178L12/A	TO-92MOD	6	Three-Terminal Regulators
HA178L12NA	TO-92	6	Three-Terminal Regulators
HA178L12P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L12UA	UPAK	6	Three-Terminal Regulators
HA178L15/A	TO-92MOD	6	Three-Terminal Regulators
HA178L15P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L15UA	UPAK	6	Three-Terminal Regulators
HA178L56/A	TO-92MOD	6	Three-Terminal Regulators
HA178L56P/PA	TO-92MOD	6	Three-Terminal Regulators
HA178L56UA	UPAK	6	Three-Terminal Regulators
HA179L05	TO-92MOD	6	Three-Terminal Regulators
HA179L05P	TO-92MOD	6	Three-Terminal Regulators
HA179L05U	UPAK	6	Three-Terminal Regulators
HA179L06	TO-92MOD	6	Three-Terminal Regulators
HA179L06P	TO-92MOD	6	Three-Terminal Regulators
HA179L06U	UPAK	6	Three-Terminal Regulators
HA179L08	TO-92MOD	6	Three-Terminal Regulators
HA179L08P	TO-92MOD	6	Three-Terminal Regulators
HA179L08U	UPAK	6	Three-Terminal Regulators
HA179L09	TO-92MOD	6	Three-Terminal Regulators
HA179L09P	TO-92MOD	6	Three-Terminal Regulators
HA179L09U	UPAK	6	Three-Terminal Regulators
HA179L10	TO-92MOD	6	Three-Terminal Regulators
HA179L10P	TO-92MOD	6	Three-Terminal Regulators
HA179L10U	UPAK	6	Three-Terminal Regulators
HA179L12	TO-92MOD	6	Three-Terminal Regulators
HA179L12P	TO-92MOD	6	Three-Terminal Regulators
HA179L12U	UPAK	6	Three-Terminal Regulators
HA179L15	TO-92MOD	6	Three-Terminal Regulators
HA179L15P	TO-92MOD	6	Three-Terminal Regulators
HA179L15U	UPAK	6	Three-Terminal Regulators
HA1630D01	TSSOP	7	Operational Amplifiers (CMOS)
HA1630D02	TSSOP	7	Operational Amplifiers (CMOS)
HA1630D03	TSSOP	7	Operational Amplifiers (CMOS)
HA1630D04	TSSOP	7	Operational Amplifiers (CMOS)
HA1630D05	TSSOP	7	Operational Amplifiers (CMOS)
HA1630D06	TSSOP	7	Operational Amplifiers (CMOS)
HA1630Q01	TSSOP	7	Operational Amplifiers (CMOS)
HA1630Q02	TSSOP	7	Operational Amplifiers (CMOS)
HA1630Q03	TSSOP	7	Operational Amplifiers (CMOS)
HA1630Q04	TSSOP	7	Operational Amplifiers (CMOS)

Type No.	Package	P	Feature
HA1630Q05	TSSOP	7	Operational Amplifiers (CMOS)
HA1630Q06	TSSOP	7	Operational Amplifiers (CMOS)
HA1630S01CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1630S02CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1630S03CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1630S04CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1630S05CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1630S06CM/LP	CMPAK-5 MPAK-5	7	Operational Amplifiers (CMOS)
HA1631S01CM/LP	CMPAK-5 MPAK-5	8	Voltage Comparators (CMOS)
HA1631S02CM/LP	CMPAK-5 MPAK-5	8	Voltage Comparators (CMOS)
HA1631S03CM/LP	CMPAK-5 MPAK-5	8	Voltage Comparators (CMOS)
HA1631S04CM/LP	CMPAK-5 MPAK-5	8	Voltage Comparators (CMOS)
HA13164A	NP2	5	Switching Regulator Controllers
HA13166	NP2	5	Switching Regulator Controllers
HA16103FPJ	SOP (JEITA)	6	Watchdog Timers
HA16103FPK	SOP (JEITA)	6	Watchdog Timers
HA16107FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16107P	DILP	5	Switching Regulator Controllers
HA16108FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16108P	DILP	5	Switching Regulator Controllers
HA16114FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16114FPJ	SOP (JEITA)	5	Switching Regulator Controllers
HA16114P	DILP	5	Switching Regulator Controllers
HA16116FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16116FPJ	SOP (JEITA)	5	Switching Regulator Controllers
HA16117FPAJ/ FPBJ/FPCJ	SOP (JEITA)	6	Watchdog Timers
HA16120FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16120FPJ	SOP (JEITA)	5	Switching Regulator Controllers
HA16121FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16121FPJ	SOP (JEITA)	5	Switching Regulator Controllers
HA16129AFPJ	SOP (JEITA)	6	Watchdog Timers
HA16129FPJ	SOP (JEITA)	6	Watchdog Timers
HA16141FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16141P	DILP	5	Switching Regulator Controllers
HA16142FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16142P	DILP	5	Switching Regulator Controllers
HA16150P	DILP	5	Switching Regulator Controllers
HA16150T	TSSOP	5	Switching Regulator Controllers
HA16158FP	SOP (JEITA)	5	Switching Regulator Controllers

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Type No.	Package	P	Feature
HA16158P	DILP	5	Switching Regulator Controllers
HA16341FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16341NT	DILP	5	Switching Regulator Controllers
HA16342FP	SOP (JEITA)	5	Switching Regulator Controllers
HA16342NT	DILP	5	Switching Regulator Controllers
HA17324A	DILP	7	Operational Amplifiers (Bipolar)
HA17324AF	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17324ARP	SOP (JEDEC)	7	Operational Amplifiers (Bipolar)
HA17324AT	TSSOP	7	Operational Amplifiers (Bipolar)
HA17339A	DILP	8	Voltage Comparators (Bipolar)
HA17339AF	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17339ARP	SOP (JEDEC)	8	Voltage Comparators (Bipolar)
HA17339AT	TSSOP	8	Voltage Comparators (Bipolar)
HA17358A	DILP	7	Operational Amplifiers (Bipolar)
HA17358AF	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17358ARP	SOP (JEDEC)	7	Operational Amplifiers (Bipolar)
HA17358AT	TSSOP	7	Operational Amplifiers (Bipolar)
HA17384HPS	DILP	5	Switching Regulator Controllers
HA17384HRP	SOP (JEDEC)	5	Switching Regulator Controllers
HA17384SPS	DILP	5	Switching Regulator Controllers
HA17384SRP	SOP (JEDEC)	5	Switching Regulator Controllers
HA17385HPS	DILP	5	Switching Regulator Controllers
HA17385HRP	SOP (JEDEC)	5	Switching Regulator Controllers
HA17393A	DILP	8	Voltage Comparators (Bipolar)
HA17393AF	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17393ARP	SOP (JEDEC)	8	Voltage Comparators (Bipolar)
HA17393AT	TSSOP	8	Voltage Comparators (Bipolar)
HA17431FP	SOP (JEITA)	5	Shunt Regulators
HA17431FPA	SOP (JEITA)	5	Shunt Regulators
HA17431HLP	MPAK-5	5	Shunt Regulators
HA17431HLTP	MPAK	5	Shunt Regulators
HA17431HP	TO-92	5	Shunt Regulators
HA17431HUP	UPAK	5	Shunt Regulators
HA17431P	TO-92MOD	5	Shunt Regulators
HA17431PA	TO-92MOD	5	Shunt Regulators
HA17431PNA/ PNAJ	TO-92	5	Shunt Regulators
HA17431UA/UPA	UPAK	5	Shunt Regulators
HA17431VLP	MPAK-5	5	Shunt Regulators
HA17431VLTP	MPAK	5	Shunt Regulators
HA17431VP/VPJ	TO-92	5	Shunt Regulators
HA17431VUP	UPAK	5	Shunt Regulators
HA17432HLTP	MPAK	5	Shunt Regulators
HA17432HUP	UPAK	5	Shunt Regulators
HA17432UA	UPAK	5	Shunt Regulators
HA17432VLTP	MPAK	5	Shunt Regulators
HA17432VUP	UPAK	5	Shunt Regulators
HA17458	DILP	7	Operational Amplifiers (Bipolar)
HA17458F	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17458FP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17458PS	DILP	7	Operational Amplifiers (Bipolar)
HA17555	DILP	9	Other Functions

Type No.	Package	P	Feature
HA17555F	SOP (JEITA)	9	Other Functions
HA17555FP	SOP (JEITA)	9	Other Functions
HA17555PS	DILP	9	Other Functions
HA17558	DILP	7	Operational Amplifiers (Bipolar)
HA17558A	DILP	7	Operational Amplifiers (Bipolar)
HA17558AF	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17558AFP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17558APS	DILP	7	Operational Amplifiers (Bipolar)
HA17558ARP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17558F	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17558FP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17558PS	DILP	7	Operational Amplifiers (Bipolar)
HA17901AFP	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17901AP	DILP	8	Voltage Comparators (Bipolar)
HA17901ARP	SOP (JEDEC)	8	Voltage Comparators (Bipolar)
HA17901AT	TSSOP	8	Voltage Comparators (Bipolar)
HA17901FPJ	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17901FPK	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17901PJ	DILP	8	Voltage Comparators (Bipolar)
HA17902AFP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17902AP	DILP	7	Operational Amplifiers (Bipolar)
HA17902ARP	SOP (JEDEC)	7	Operational Amplifiers (Bipolar)
HA17902AT	TSSOP	7	Operational Amplifiers (Bipolar)
HA17902FPJ	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17902FPK	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17902PJ	DILP	7	Operational Amplifiers (Bipolar)
HA17903AFP	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17903APS	DILP	8	Voltage Comparators (Bipolar)
HA17903ARP	SOP (JEDEC)	8	Voltage Comparators (Bipolar)
HA17903AT	TSSOP	8	Voltage Comparators (Bipolar)
HA17903FPJ	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17903FPK	SOP (JEITA)	8	Voltage Comparators (Bipolar)
HA17903PSJ	DILP	8	Voltage Comparators (Bipolar)
HA17904AFP	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17904APS	DILP	7	Operational Amplifiers (Bipolar)
HA17904ARP	SOP (JEDEC)	7	Operational Amplifiers (Bipolar)
HA17904AT	TSSOP	7	Operational Amplifiers (Bipolar)
HA17904FPJ	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17904FPK	SOP (JEITA)	7	Operational Amplifiers (Bipolar)
HA17904PSJ	DILP	7	Operational Amplifiers (Bipolar)

Switching Regulator Controllers

Function	Type No.	Vin (V) max	ICC (mA) max	Fmax (kHz) max	RREJ (dB) typ	Topr (°C)	Status				Terminal	Remarks					
							DILP	SOP	TSSOP	NP2							
Switching Regulator	HA16107P	30	20	600	-	-20 to +85	O				16	Timer latch fail safe, voltage mode					
	HA16107FP							O			16	Both forward and flyback method available					
	HA16108P						O				16	ON/OFF timer latch fail safe, voltage mode					
	HA16108FP							O			16	Both forward and flyback method available					
	HA17384SPS	30	13	500	-	-20 to +105	O				8	Current mode type AC/DC					
	HA17384HPS						O				8	OVP+TSD (H type only)					
	HA17385HPS						O				8						
	HA17384SRP							Δ			8	Current mode type AC/DC					
	HA17384HRP							Δ			8	OVP+TSD (H type only)					
	HA17385HRP							Δ			8	JEDEC SOP					
	HA16141P						20	9	Fixed 100(PFC) 200(PWM)	-	-20 to +105	Δ				16	PFC+PWM (AUX) Combo. IC
	HA16141FP												Δ				
	HA16142P	20	9	Fixed 100(PFC) 200(PWM)	-	-20 to +105	Δ				16	PFC+PWM Combo. IC					
	HA16142FP							Δ				PWM duty max 50%					
	HA16150P	20	1.0	1 MHz	-	-40 to +85	SPL				16	Two-drive trs available in current mode. ex.) Push Pull, Half Bridge					
	HA16150T								SPL								
	HA16158P	24	1.0	200	-	-40 to +105	SPL				16	PFC+PWM adjustable frequency, f-down mode					
	HA16158FP			400				SPL									
	HA16341NT	18	10	500	-	-20 to +105	Δ				24	Current Share, hot swap, rectifier and multi function IC Duty 50% or more					
	HA16341FP							Δ			26						
	HA16342NT						Δ				24	Current Share, hot swap, rectifier and multi function IC Duty 50% or less					
	HA16342FP							Δ			26						
	HA16114P	40	11	600	-	-20 to +85	O				16	1 ch step down/negative output DC/DC					
	HA16114FP							O									
	HA16114FPJ							Δ									
	HA16120FP							O									
	HA16120FPJ					-40 to +85		Δ				1 ch step up DC/DC					
	HA16116FP							O			20	2 ch step down/negative output DC/DC					
	HA16116FPJ							Δ									
	HA16121FP							O				2 ch step up/step down/ negative output DC/DC					
	HA16121FPJ							Δ									
Multi Voltage Regulator	HA13164A	5Vx2, 9V, 8V, High side x2				-40 to +85				O	15	For Car Audio					
	HA13166	3.3V, 5Vx2, 9V, 8V, High side x2								O							

Shunt Regulators

Type No.	Vkma x (V)	Ioff (μA) max	Vref (V)	Ik (mA)	Topr (°C)	Status						Terminal
						SOP	TO-92MOD	TO-92	UPAK	MPAK-5	MPAK	
HA17431P	40	1	2.495±4%	-100 to +150	-20 to +85		Δ					3
HA17431FP			Δ							8		
HA17431PA						Δ				3		
HA17431PNA							O			3		
HA17431FPA			O							8		
HA17431UA/UPA								O		3		
HA17432UA	16		2.5±1%	-50 to +50					O			3
HA17431VP								O			3	
HA17431VLP									O		5	
HA17431VUP								Δ			3	
HA17432VUP								Δ			3	
HA17431VLTP										Δ	3	
HA17432VLTP	36									Δ		3
HA17431HLP									O			5
HA17431HUP								Δ				3
HA17432HUP								Δ				3
HA17431HP								O				3
HA17431HLTP											Δ	
HA17432HLTP	16		1.24±1.5%	-30 to +50						Δ		3
HA17L431P								O				3
HA17L431LP									O			5
HA17L431UP									O			3
HA17L432UP									Δ			3
HA17L431AP								O				3
HA17L431ALP			1.24±1.0%						O			5
HA17L431ALTP										O		3
HA17L432ALTP											O	

Notes: O: Mass Production
Δ: Can be mass produced
SPL: Samples available
OS: Overseas sales only

Three-Terminal Regulators

Positive Voltage

Output Current	Type No.	Vout (V)	Topr (°C)	Status		
				TO-92MOD	TO-92	UPAK
100mA	HA178L02/A	2.5	-20 to +75	Δ		
	HA178L02P/PA			Δ		
	HA178L02UA					Δ
	HA178L05/A	5	-20 to +75	O		
	HA178L05P/PA			O		
	HA178L05UA					O
	HA178L56/A	5.6	-20 to +75	Δ		
	HA178L56P/PA			Δ		
	HA178L56UA					Δ
	HA178L06/A	6	-20 to +75	Δ		
	HA178L06P/PA			Δ		
	HA178L06UA					Δ
	HA178L08/A	8	-20 to +75	Δ		
	HA178L08P/PA			Δ		
	HA178L08UA					O
	HA178L09/A	9	-20 to +75	Δ		
	HA178L09P/PA			Δ		
	HA178L09UA					O
	HA178L10/A	10	-20 to +75	Δ		
	HA178L10P/PA			Δ		
	HA178L10UA					O
	HA178L12/A	12	-20 to +75	O		
	HA178L12P/PA			O		
	HA178L12UA					O
	HA178L15/A	15	-20 to +75	Δ		
	HA178L15P/PA			Δ		
	HA178L15UA					O
	HA178L05NA	5	-20 to +85		Δ ^{OS}	
	HA178L08NA	8			Δ ^{OS}	
	HA178L12NA	12			Δ ^{OS}	

Negative Voltage

Output Current	Type No.	Vout (V)	Topr (°C)	Status	
				TO-92MOD	UPAK
100mA	HA179L05	5	-20 to +85	O	
	HA179L05P			Δ	
	HA179L05U				O
	HA179L06	6		Δ	
	HA179L06P			Δ	
	HA179L06U				O
	HA179L08	8		Δ	
	HA179L08P			Δ	
	HA179L08U				O
	HA179L09	9		Δ	
	HA179L09P			Δ	
	HA179L09U				O
	HA179L10	10		Δ	
	HA179L10P			Δ	
	HA179L10U				Δ
	HA179L12	12		Δ	
	HA179L12P			Δ	
	HA179L12U				O
	HA179L15	15		Δ	
	HA179L15P			Δ	
	HA179L15U				O

•Output Voltage Precision & Grade

Grade	HA178Lxx Series	HA179Lxx Series
Standard	±8%	±4%
A Grade	±5%	-

Note: Type No. with suffix "P" means telecommunication industrial use; others are consumer use.

Watchdog Timers

Function	Type No.	Vin (V) max	ICC (mA) max	Fmax (kHz) max	RREJ (dB) typ	Topr (°C)	Status		Terminal	Remarks
							DILP	SOP		
Watchdog timer	HA16103FPJ	40	12	-	75	-40 to +85		O	20	Low voltage detection
	HA16103FPK	40	12	-	75	-40 to +125		O	20	
	HA16129FPJ	40	15	-	75	-40 to +85		O	20	1 ch type, output voltage 5.0±1.5%, fail safe function built-in
	HA16129AFPJ			-				O		
	HA16117FPAJ/FPBJ/FPCJ	14	0.6	-	-	-40 to +85		O	8	CMOS 4.4, 4.2 and 4.0V type detection voltage

Operational Amplifiers (Bipolar)

Function	Type No.	VCC (V)	ICC (mA) max	VIO (mV) max	SR (V/μs) typ	Topr (°C)	Status			Terminal	Remarks
							DILP	SOP	TSSOP		
Dual	HA17358ARP	+32	2	7	0.2	-40 to +85		O		8	(JEDEC)
	HA17358A						O			8	No error against RF noise
	HA17358AF							O		8	
	HA17358AT								O	8	
	HA17458	±18	6.6	6	0.6	-20 to +75	O			8	Standard
	HA17458F							O		8	
	HA17458FP							O		8	
	HA17458PS						Δ			8	
	HA17558	±18	5.6	6	1	-20 to +75	O			8	Standard
	HA17558F							O		8	
	HA17558FP							O		8	
	HA17558PS						O			8	
	HA17558A	±18	5.6	6	1	-40 to +85	SPL ^{OS}			8	Low Noise No error RF noise
	HA17558APS						SPL ^{OS}			8	
	HA17558AF							SPL ^{OS}		8	
	HA17558AFP							SPL ^{OS}		8	
	HA17558ARP	+32	2	7	0.2	-40 to +85		SPL ^{OS}		8	(JEDEC)
	HA17904ARP							O		8	
	HA17904AFP							O		8	
	HA17904APS						O			8	No error against RF noise
	HA17904AT								O	8	
	HA17904FPJ							O		8	
	HA17904PSJ						O			8	
	HA17904FPK							O		8	
						-40 to +125		O		8	
Quad	HA17324ARP	+32	2	7	0.19	-40 to +85		O		14	(JEDEC)
	HA17324A						O			14	No error against RF noise
	HA17324AF							O		14	
	HA17324AT								O	14	
	HA17902ARP	+32	2	7	0.19	-40 to +85		O		14	(JEDEC)
	HA17902AP						O			14	No error against RF noise
	HA17902AFP							O		14	
	HA17902AT								O	14	
	HA17902PJ	+28	2	8	0.19		O			14	
	HA17902FPJ							O		14	
	HA17902FPK							O		14	
								O		14	

Operational Amplifiers (CMOS)

Function	Type No.	VDD (V)	IDD (μA) typ	VIO (mV) max	SR (V/μs) typ	Topr (°C)	Status			Terminal	Remarks
							CMPAK-5	MPAK-5	TSSOP		
Single	HA1630S01CM/LP	1.8 to 5.5	15	4	0.125	-40 to +85	O	O		5	Output full swing
	HA1630S02CM/LP		50		0.5		O	O		5	Standard
	HA1630S03CM/LP		100		1		O	O		5	
	HA1630S04CM/LP		200		2		O	O		5	Output full swing High slew rate
	HA1630S05CM/LP		400		4		O	O		5	
	HA1630S06CM/LP		800		8		O	O		5	
Dual	HA1630D01T		15		0.125				O	8	Output full swing Standard
	HA1630D02T		50		0.5				O	8	
	HA1630D03T		100		1				O	8	
	HA1630D04T		200		2				O	8	Output full swing High slew rate
	HA1630D05T		400		4				O	8	
	HA1630D06T		800		8				O	8	
Quad	HA1630Q01T		15		0.125				Δ	14	Output full swing Standard
	HA1630Q02T		50		0.5				Δ	14	
	HA1630Q03T		100		1				Δ	14	
	HA1630Q04T		200		2				Δ	14	Output full swing High slew rate
	HA1630Q05T		400		4				Δ	14	
	HA1630Q06T		800		8				Δ	14	

Notes: O: Mass Production
Δ: Can be mass produced
SPL: Samples available
^{OS}: Overseas sales only

Voltage Comparators (Bipolar)

Function	Type No.	VCC (V)	ICC (mA) max	VIO (mV) max	Response time (μs) typ	Topr (°C)	Status			Terminal	Remarks
							DILP	SOP	TSSOP		
Dual	HA17393A	+36	2	7	1.3	-40 to +85	O			8	No error against RF noise (JEDEC)
	HA17393AF							O		8	
	HA17393ARP							O		8	
	HA17393AT								O	8	
	HA17903ARP							O		8	(JEDEC)
	HA17903APS						O			8	
	HA17903AFP							O		8	
	HA17903AT								O	8	
	HA17903FPJ					-40 to +85		O		8	
	HA17903PSJ					-40 to +125	O			8	
	HA17903FPK							O		8	
Quad	HA17339A	+36	2	7	1.3	-40 to +85	O			14	No error against RF noise (JEDEC)
	HA17339AF							O		14	
	HA17339ARP							O		14	
	HA17339AT								O	14	
	HA17901ARP					-40 to +85		O		14	(JEDEC)
	HA17901AP						O			14	
	HA17901AFP							O		14	
	HA17901AT								O	14	
	HA17901PJ					-40 to +85	O			14	
	HA17901FPJ					-40 to +125		O		14	
	HA17901FPK							O		14	

Voltage Comparators (CMOS)

Function	Type No.	VDD (V)	IDD (μA) typ	VIO (mV) max	Response time (μs) typ		Topr (°C)	Status		Terminal	Remarks	
					TP _{HL}	TP _{LH}		SOP	TSSOP			
Single (Low Consumption)	HA1631S01CM	1.8 to 5.5	5	5	0.46	1.02	-40 to +85	SPL		5	Push-pull type	
	HA1631S01LP							SPL				
	HA1631S03CM				-	SPL					Open drain type	
	HA1631S03LP							SPL				
Single (High SR)	HA1631S02CM		50		0.12	0.28			SPL			Push-pull type
	HA1631S02LP							SPL				
	HA1631S04CM				-	SPL						
	HA1631S04LP							SPL				Open drain type

Notes: O: Mass Production
Δ: Can be mass produced
SPL: Samples available
OS: Overseas sales only

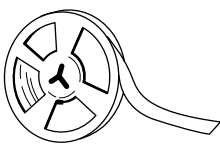
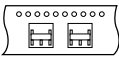
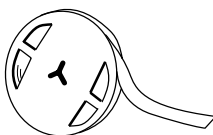
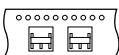

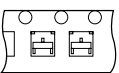
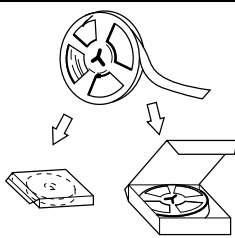
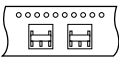

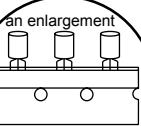

Other Functions

Function	Type No.	Vcc (V)	Trigger Voltage (V)	Reset Current (mA)	Topr (°C)	Status		Terminal	Remarks
						DILP	SOP		
Precision Timer	HA17555	5 to 15	5.0	0.1	0 to +70/ -20 to +75	O		8	Monostable and astable multivibrator
	HA17555PS					O		8	
	HA17555F						O	8	
	HA17555FP						O	8	

Discontinued Type No.

Type No.		
HA1127FP	HA17012P	HA17723
HA1127P	HA17080PS/PA	HA17723F
HA16113FPJ	HA17082PS/PA	HA17723P
HA16117FPA/FPB/FPC	HA17083P/PA	HA17733P
HA16654APS	HA17084P/PA	HA17741
HA16664AFP	HA17301P	HA17741PS
HA16664APS	HA17408P	HA17747
HA16666FP	HA17474	HA17747P
HA16666P	HA17474P	HA1835P
HA178M05	HA178M05P	HA178M06
HA178M06P	HA178M07	HA178M07P
HA178M08	HA178M08P	HA178M09
HA178M09P	HA178M12	HA178M12P
HA178M15	HA178M15P	HA178M18
HA178M18P	HA178M20	HA178M20P
HA178M24	HA178M24P	HA17805V
HA17805VP	HA17806V	HA17806VP
HA17807V	HA17807VP	HA17808V
HA17808VP	HA17812V	HA17812VP
HA17815V	HA17815VP	HA17818V
HA17818VP	HA17824V	HA17824VP
HA17008RFP	HA17524FP	HA17451AP
HA17008RP	HA17524P	HA17451AFP

Standard Taping Specifications

Package		Packing Unit (pcs/reel)	Symbol	Appearance	Magazine	
					(pcs/Stick)	(pcs/Inner Box)
SOP (JEITA)	FP-8D	2,500	-EL	<div><div><div><div></div><div></div><div></div></div><div>1PIN</div><div>EL</div></div><div>(type No.) + (-EL)</div><div>(EIAJ-RC-1011)</div></div> <div></div>	96	960
	FP14DA/ 16DA	2,000			47	470
	FP-20DA	1,000			38	380
	FP-24D				30	900
SOP (JEDEC)	FP-8DC	2,500	-EL	<div><div></div><div>→Pulling direction→</div><div>(type No.) + (-EL)</div></div> <div></div>	96	960
	FP-14DN	2,500			55	550
TSSOP	TSSOP-8	3,000	EL	<div><div></div><div>→Pulling direction→</div><div>(type No.) + (EL) or (ELL)</div></div> <div></div>	-	-
	TSSOP-14	2,000	ELL		-	-
UPAK		1,000 or 1,000 x 4	-TL	<div><div></div><div>→Pulling direction→</div><div>(type No.) + (-TL)</div><div>(EIAJ-RC-1009A)</div></div> <div></div>	25	2500
MPAK-5 MPAK CMPAK-5		3,000	-EL	<div><div></div><div>→Pulling direction→</div><div>(type No.) + (-EL)</div></div> <div></div>	-	-
TO-92/ TO-92MOD		2,500 (pcs/BOX)	-TZ	<div><div><div><div>an enlargement</div></div><div>(type No.) + (-TZ)</div></div><div><div>Fan-Fold Box</div></div><div>(EIAJ-RC-1008B)</div></div>	-	-
DILP	DP-8	-	-	-	49	980
	DP-14/16				25	500
	DP-20				19	380

“-EL” “-TL” (UPAK) is the counterclockwise-reeled emboss-tape type.
 Please order the products in multiples of 1000 when they are shipped in magazines.
 Please order the products in packing units when they are shipped in reel.

Cross Reference

Function	NEC	TOSHIBA	MATSUSHITA	JRC	mitsubishi	NS	ON	TI	Philips	Stmicro	Fairchild	FUJITSU	Others	HITACHI
Single Op-Amps		TC75S55FU TC75S55F		NJU7011F NJU7042F NJU7007F2				TLC27L1						HA1630S01
		TC75S51FU/F				LMC6041 LMC6061		TLV2211					S11 S89110	HA1630S02
		TC75S54F		NJU7012F		LMC7111 LPC661								HA1630S03
		TC75S54FU		NJU7013F NJU7008F2				TLV2221 TLV2721						HA1630S04
				NJU7017F		LMV301								HA1630S05
		TC75S60FU/F				LMC6081 LMC7101 LMV751		TLV2470 TLV2471 TLV4110 TLV4111						HA1630S06
Dual Op-Amps	μPC1458	TA75458		NJM1458		LM1458		MC1458						*HA17458
	μPC258 μPC4558	TA75558	AN6552	NJM4558	M5218								ROHM BA4558	*HA17558 *HA17558A
	μPC358 μPC1251	TA75358	AN1358/6562	NJM2904	M5223	LM358	LM358	LM358	LM358	LM358	LM358	MB47358	ROHM SANYO BA10358 LA6358	*HA17358A *HA17904A
		TC75W55FU		NJU7014V				TLC27L2 TLC27L7						HA1630D01
		TC75W51FU				LMC6062								HA1630D02
		TC75W54FU		NJU7014V NJU7019V		LMC6022 LMC6572 LPC662		TLV2252 TLV2422						HA1630D03
Quad Op-Amps	μPC451	TA75902	AN1324	NJM2902		LM2902		LM2902				MB3615		*HA17902A
	μPC324	TA75324	AN1324/6564	NJM324	M5224	LM324	LM324	LM324	LM324	LM324	LM324	MB3614	ROHM SANYO BA10324A LA6324	*HA17324A
				NJU7016V				TLV2322 TL2432						HA1630D04T
				NJU7018V				TLC27M7 TLV2262 TLV2332						HA1630D05T
		TC75W60FU		-		LMC6032 LMC6035 LMC6082 LMC6482 LMC6492 LMC662		TLC2262 TLC25M2						HA1630D06T
Dual Comparators	μPC277 μPC393	TA75393	AN1393/6914	NJM2903	M5233	LM2903 LM393		LM393				MB47393	ROHM BA10393	*HA17903A *HA17393A
Quad Comparators	μPC339 μPC177	TA75339	AN1339/6912	NJM2901	M5234	LM339 LM2901	LM339	LM339	LM339	LM339	LM339	MB4204	ROHM SANYO BA10339 LA6339	*HA17339A *HA17901A
Three-Terminal Regulators	Positive Voltage	μPC78L00 Series	TA78L00 Series	AN78L00 Series	NJM78L00 Series	M5278L00 Series	LM78L00 Series	μA78L00 Series						*HA178L00 Series
	Negative Voltage		TA79L00 Series	AN79L00 Series	NJM79L00 Series		LM79L00 Series							*HA179L00 Series
Timer		μPC1555		NJM555	M51841	LM555		NE555					SANYO LB8555	*HA17555
Switching Regulators Controllers	AC/DC	μPC1094 μPC1099		AN8090		M51996 M51997 M51978						MB3769		*HA16107 *HA16108
													UNIT RODE	UC3842A *HA17384SPS
	DC/DC	μPC1100		AN8011S									FUJI FA7611M FA7622M	*HA16114 *HA16120 *HA16116 *HA16121
Shunt-Regulators	μPC1093J	TA76431S	AN1431T	NJM431L		LM431ACZ	TL431	TL431CLP						HA17431PNA
			AN1431M	NJM431U				TL431CPK						HA17431UA
	μPC1944J							TLV431ACLP						HA17L431P
	μPC1093T	TA76431F												HA17432UA
														HA17431VLP
	μPC1943T													HA17L431UP
	μPC1944T	TA76432F												HA17L432UP
			AN1432MS											HA17L432ALTP
	μPC1093G			NJM431M		LM431AC M	TL431	TLV431CDBV						HA17L431LP HA17431FPA

Note 1: *: Surface mount package available.

Note 2: Electrical characteristics and pin arrangements differ among equivalent.

Discrete Semiconductor Data Book

•Printing

	Document Name	Publication Data	Document No.
English	Hitachi Linear ICs for Power Supply Applications (Former Hitachi Standard Linear ICs)	2002.9	ADE-404-002C



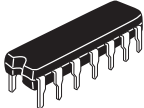
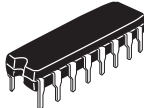
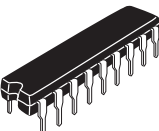
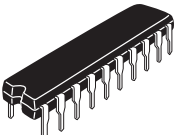
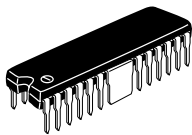
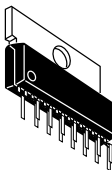

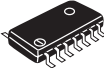
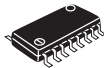
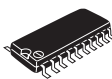
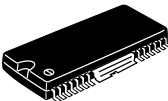
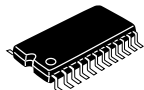









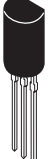
Package Code

Outline	DILP		SOP(JEITA)	SOP(JEDEC)	TSSOP	SIP	UPAK	MPAK	MPAK-5	CMPAK-5
	8 pins	14 pins or more	8 pins or more	8 pins or more	8/14 pins	3 pins	3 pins	3 pins	5 pins	5 pins
Material	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic	Plastic
Suffix	Consumer	*-	F	RP	T	*-	-	-	LP	CM
	Industrial	PS	FP	RP	T	P	U	LTP	LP	CM

Note: * The type no. is followed by the suffix, except for packages marked with * in the above table.

Package

$$\left(\frac{\text{Pin Pitch (mm)}}{\text{SOP Package Width (mil)}} \right)$$

DILP  DP-8 $\left(\frac{2.54}{-} \right)$  DP-8B $\left(\frac{2.54}{-} \right)$  DP-14 $\left(\frac{2.54}{-} \right)$  DP-16 $\left(\frac{2.54}{-} \right)$  DP-18/A $\left(\frac{2.54}{-} \right)$  DP-20N $\left(\frac{2.54}{-} \right)$  DP-24TS $\left(\frac{1.78}{-} \right)$							NP2 
SOP (JEITA)  FP-8D $\left(\frac{1.27}{225} \right)$  FP-14DA $\left(\frac{1.27}{300} \right)$  FP-16DA $\left(\frac{1.27}{300} \right)$  FP-20DA $\left(\frac{1.27}{300} \right)$  FP-26DT  FP-24D $\left(\frac{1.27}{450} \right)$							SOP (JEDEC)  FP-8DC $\left(\frac{1.27}{150} \right)$  FP-14DN $\left(\frac{1.27}{150} \right)$
CMPAK-5 	TSSOP-8 	TSSOP-14 	MPAK-5 	MPAK 	UPAK 	SIP  TO-92  TO-92MOD	

Note: These packages are not full size.