Chapter 13

Specifications

This chapter presents the functional specifications and the general specifications of the 2534.

13.1 Specifications

Input Section

Item \ Input	Voltage (V)	Current (A)
Input type	Floating inputs (but no isolation between V & A terminals)	
	Resistive voltage divider	Shunt input
Rated range values (Range display)	75/150/300/600V	Current inputs: 1, 2, 5A External shunt input: 50, 100, 200mV
Guaranteed accuracy range	10% to 110% of rated value	
Instrument loss	Input resistance, approx. 2Ω (all ranges) (approx. 60pF in parallel)	Approx. 15Ω External shunt input resistance: Approx. 2kΩ
	Approx. 200pF between input terminals (±) and case	
Usable frequency range	DC, and 10Hz to 20kHz	
Maximum allowable instantaneous input (for 1 sec)	Peak value of 1400V or 3 times range, whichever is lower	Peak value of 7 times range or 70A, whichever is lower External shunt input range: Peak voltage is 5V max.
Maximum allowable continuous input (at 50/60Hz)	Peak of 1000V, or rms value of 2 times range, whichever is lower	Peak of 50A, rms value of 30A, or rms value of 3 times range, whichever is lower External shunt input range: Peak voltage is 1V max.
Maximum continuous common mode voltage 50/60Hz	600Vrms	
Common mode voltage influence (at 50/60Hz)	±0.03% of range max. (with input terminals shorted, 600V applied between inputs and case)	±0.03% of range max. (with input terminals open, 600V applied between input (±) and case)
Input terminals	Binding posts	Large binding posts External shunt input: round 4-pin connector (accessory)
Input over-range detection	2.5 times rated range value	3 times rated range value
A-D conversion section	Simultaneous sampling of voltage & current inputs Resolution: 12bits Maximum conversion rate: 42kS/s	
Range selection	V and A can be independently selected using manual, automatic, or external control (GP-IB or RS-232-C interface)	
Auto range selection	Range upshift : If measured value exceeds 110% of rating Range downshift : If measured value falls below 50% of rating (or below 20% of rated value in 5A range)	

Measurement Functions

Item		Voltage (V)	Current (A)	Power (W)
Frequency range		DC, and 10Hz to 20kHz		
Crest factor		Max. 2.5 at rated input	Max. 3 at rated input	—
DISPLAY accuracy*	DC	± (0.4% of reading + 0.2% of range)		
	10≦f<25Hz	± (1.5% of range)		
	25≦f<45Hz	± (0.5% of reading + 0.4% of range)		
	45≦f≦66Hz	± (0.25% of reading + 0.1% of range) *1		
	66<f≦2kHz	± (0.5% of reading + 0.4% of range)		
	2k<f≦10kHz	± (1.5% of range)		
	10k<f≦20kHz	± (3.5% of range)		
Power factor influence (when cosφ=0.5, at 50/60Hz)		—		±0.5% of reading max.
Temperature coefficient (at 5 to 20°C or 26 to 40°C)		±0.05% of range/°C		

* Measurement conditions for display accuracy:

Ambient temperature	: 23±3°C	Calibration interval	: 90 days
Ambient humidity	: 45% to 75% R.H.	Scaling	: Off
Power voltage	: 100VAC±1%	Input range	: 10% to 110% of range rated value
Input waveform	: Sine wave		
Common mode voltage	: 0V	Filter	: Off
		Power at cosφ=1	

*1 When External Shunt Input is used ±(0.4 of reading + 0.1% of range)

Display Functions

Display: LED (light-emitting diode)

Display	Displayed Information	Maximum Display Value
A	V	V : 9999 A : 9999
B	A Elapsed active power integration time	
C	V, A, W, VA, var, PF, deg, Wh, Hz	Wh : 999999 to −99999 Hz : 9999

Displayed information

Units display: m, k, M, V, A, W, VA, var, Hz, Wh, deg, s

Display update interval: Approx. 500ms (Sample rate: Approx. 250ms)

Response time: Max. 1.5 sec.
(Time to settle to final value, within specified accuracy, after step change from 10% to 100% of range, or 100% to 10% of range)

- **Display Scaling Function**

Significant digits: Automatically selected according to significant digits in voltage/current range

Setting range: 1.000 to 10000 (External shunt current: 1.000 to 1000A)

Settings: DISPLAY A: PT ratio
DISPLAY B: CT ratio, external shunt current

- **Display Averaging Function**

Method: Exponential averaging

Attenuation factor: 8 (fixed)

Computation Functions

Computation Item	Apparent Power VA	Reactive Power var	Power Factor PF	Phase Angle deg
Computation formula	V×A	$\sqrt{(V\times A)^2-W^2}$	$\frac{W}{V\times A}$	$COS^{-1}\left(\frac{W}{V\times A}\right)$
Computation range	Rated value determined by V and A range	Rated value determined by V and A range (var≥0)	−1.000 to 1.000	G90.0 to 0.0 to d90.0
Computation accuracy	±0.05% of rated VA value	±0.05% of rated var value	±0.002 (When power factor is "1")	±0.2deg (When phase angle is 60 deg)

Note : The 2534 obtains the reactive power, (var), apparent power, (VA), power factor, (PF), and phase angle, (deg), from the voltage, current, and active power by digital computation. In the case of non-sinusoidal (distorted) input waveforms, these values may differ from those obtained with instruments employing different measurement principles.

Integrator Functions (Wh)

Maximum display	−99999 to 999999
Maximum integration time	99h, 59min
Measured frequency range	DC, 10Hz to 20kHz
Display	DISPLAY C shows Wh value
Timer	Integration can be stopped automatically based on timer preset Setting range: 00h 00min to 99h 59min ("00h 00min" selects manual mode)
Elapsed time	DISPLAY B shows time elapsed since integration start
Count overflow	If integration value overflows, elapsed time is saved and integration is stopped
Accuracy	±(measurement accuracy ±0.2% of reading)
Timer accuracy	±0.02%
Remote control	Start, stop, and remote control can be performed using an external contact signal

Frequency Measurement

Measurement method	Reciprocal counting method
Measured input	Voltage or current
Accuracy	± (0.1% of range + 1digit)
Minimum input sensitivity	10% of rated input
Display range	4.00Hz to 22.00kHz
Frequency measurement range	See table below

Filter	Frequency Measurement Range
ON	4Hz to 300Hz
OFF	4Hz to 22kHz

D/A Converter Output

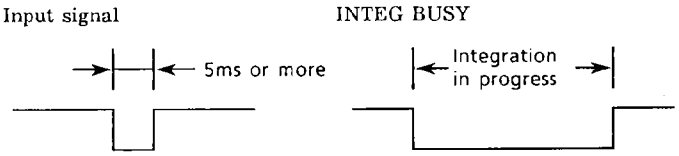
System	15-bit PWM
Output voltage	±5VDC for each rated value (max., approx. 7.5VDC)
Accuracy	± (measurement accuracy +0.2% of FS)
Temperature coefficient	±0.05% of FS/°C
Output data	Any data type that can be displayed in DISPLAY C (V, A, W, VA, var, PF, deg, Hz)
Output update interval	Approx. 500ms (same as display update interval)
Response time	Approx. 2 sec. (display response +approx. 500ms) (Time to settle to final value, within specified accuracy, after step change from 10% to 100% of range, or 100% to 10% of range, with filter OFF.)

External Control Input and Outputs

Signal level: TTL

Signal types:

Signal Name	Input/Output	Function
$\overline{\text{EXT HOLD}}$	Input	Display data update hold
$\overline{\text{EXT TRIG}}$		Update display during display hold
$\overline{\text{INTEG START}}$		Active power integration start
$\overline{\text{INTEG STOP}}$		Active power integration stop
$\overline{\text{INTEG RESET}}$		Active power integration reset
$\overline{\text{INTEG BUSY}}$	Output	Active power integration in progress



Communication Specifications

- **GP-IB**

Electrical and mechanical specifications	Conform to IEEE St'd 488.1-1978
Interface functions	SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0

- **RS-232-C**

Transmission mode	Asynchronous start-stop
Baud rate	1200, 2400, 4800, 9600

IC Memory Card

Card types	IC memory cards of up to 64Kbytes capacity
Functions	Store and recall measured data Save and reload panel setup information Initialize IC memory card

General Specifications

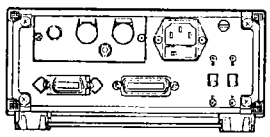
Operating temperature range	5 to 40°C
Operating humidity range	20% to 80% R.H. (non-condensing)
Warm-up time	Approx. 30 min. (to satisfy all specifications)
Insulation resistance	50MΩ min at 500VDC (between input terminals and case, between input terminals and output terminals, between input terminals/output terminals/case and power supply)
Withstanding voltage	2200VAC, 50/60Hz, for 1 minute (between input terminals and case, between input terminals and output terminals, between input terminals and power supply) 1500VAC, 50/60Hz, for 1 minute (between output terminals/case and power supply)
Power supply voltage	100VAC, 115VAC, 200VAC, 230VAC
Power voltage range	±10% of rating
Frequency	50Hz/60Hz
Frequency range	48 to 63Hz
Power consumption	Approx. 20VA
External dimensions	Approx. 88×213×350mm (excluding legs, terminals, etc.)
Weight	Approx. 4.5kg
Accessories	One power cord, one spare fuse, one remote control connector, one user's manual (this manual)

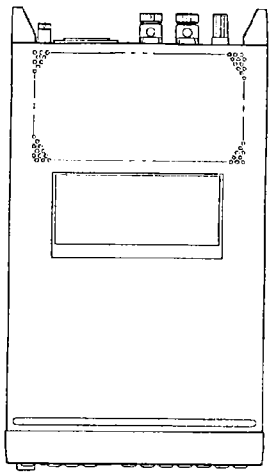
Outline Drawings

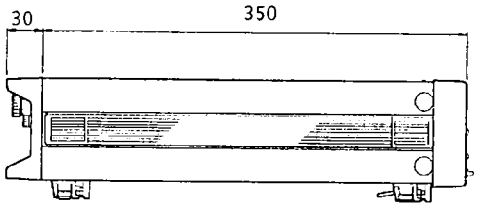
Model 2534 10

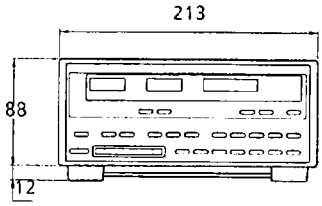
Units: mm

Rear View

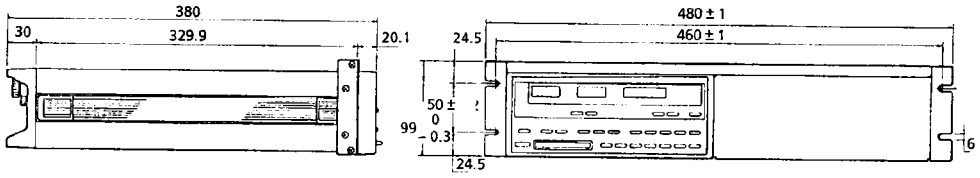


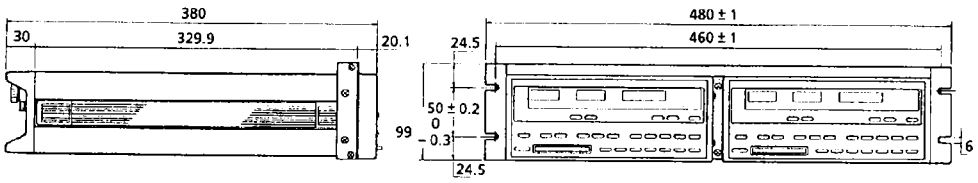






- **Rack Mount (JIS)**





- **Rack Mount (EIA)**