metawafer technologies®

ïSDR 3.0

Semiconductor Device Response

Immediate productivity with newest library ïPDQ 10.

Beyond Rack & Stack. Test with confidence regardless of the actual hardware.

Hassle-free test plans in minutes with intuitive drag-drop-click.

Increase ROI for your Agilent system testers.

System Performance at Instrument Prices

Today and Tomorrow's Sensible Solution

ïSDR (E3500A) is a fully-realized cost-effective package for today's and tomorrow's testing. It integrates a spectrum of multiple-vendor measurement resources, has a powerful intuitive executive for creating and executing tests, and showcases ïPDQ 10, the most trusted reliability test library proven worldwide. ÏSDR provides out-of-the-box productivity and confidence.

ÏSDR is more than the economy and flexibility of rack & stack. Hardware resources are characterized so measurements using different models or brands return consistent results. Your TDDB or Vt measurements using an Agilent 4142B in one lab will match another lab using a Keithley 4200. Or, an E5260A measurement would match the Agilent 4072. ïSDR fosters interoperability across labs and test floors, and preserves your tests.

Protect 4062UX Investment

ïSDR protects your investment in the Agilent 4062UX. The HP-UX controller, 4142B and switch matrix are past end of life, but with ïSDR, this is no longer a problem.

Under ïSDR, a defective or obsolete module can be replaced with a current equivalent: swap an E5260A for a 4142B, and your tests continue to run as before.

Solution for Obtaining Optimum Results

Obtain Uniform Data

- Use Standardized Test Cell
- Verify data is taken at correct time - synchronization is critical

Test Software

- Standardized and Proven
- Verified by Sematech and leading fabs
- JEDEC compliant library

Collection

- Monitor Statistically Significant Samples
- Monitor Correct Parameters Accurately

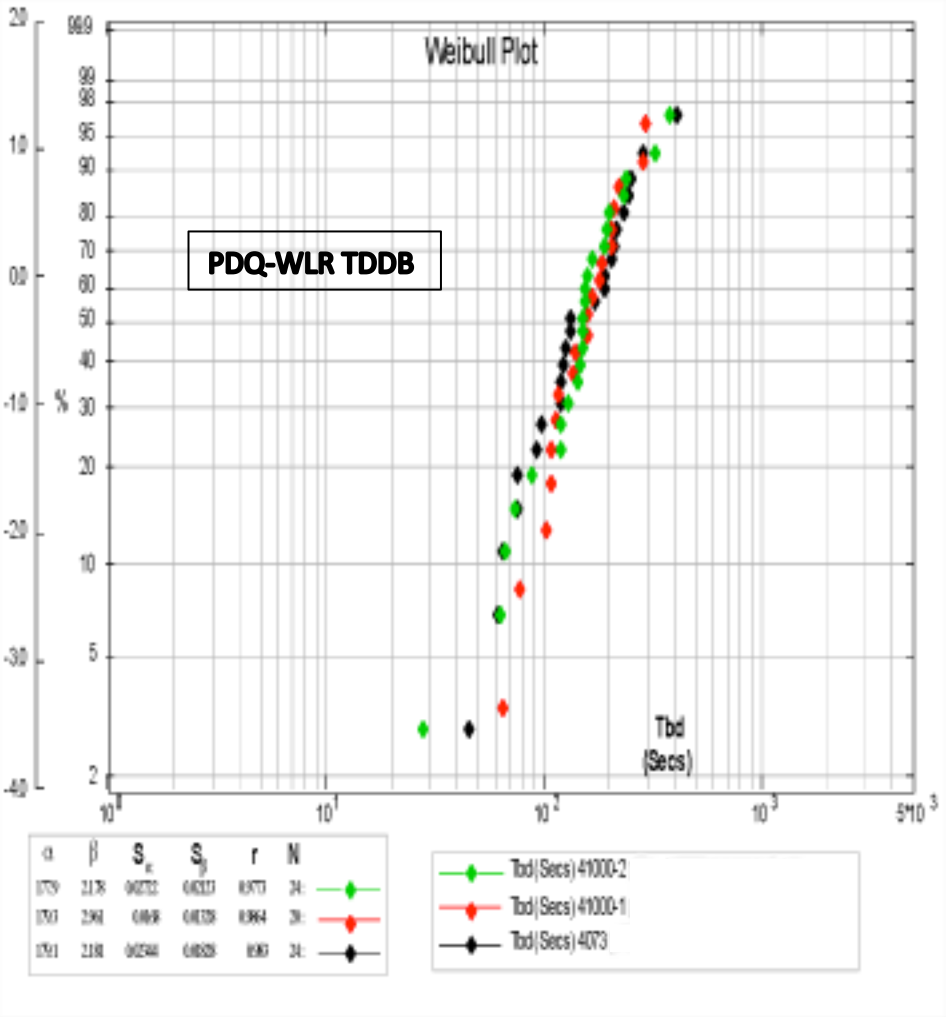
Leverage your Agilent System Tester

Developed in conjunction with Agilent Technologies, measurements using the built-in library have been correlated to the Agilent families of system testers. SPECS user algorithms and test plans for the 4062, 4070, or 4080 can be exported or imported to ÏSDR.

Interfaces in ïSDR are designed with the Agilent SPECS user in mind. The same test plan hierarchy is available and optimized for the instrument environment, and test plans can be directly imported or exported from system testers

ÏSDR accelerates development of tests that can be used with Agilent system testers without using precious HVM tester time.

Agilent 4073B Versus ïSDR



Rational Measurement Resources

Conventionally, the end user is responsible for understanding the characteristics of the instruments being used. The typical software driver simply sends the appropriate commands. In ïSDR, algorithms written use a standardized instruction set that insulates the measurement technique from the vagaries of similar hardware resources but each with it's own special issues.

ÏSDR algorithms produce the same results virtually independent of the actual hardware topology. Your investment is protected and can be exported to other labs including system testers. In addition, users can develop their own drivers to add hardware not yet part of ïSDR.

Resource	Hardware
SMU	Agilent 4155/6 B/C with Agilent 41501 A/B Expander Box with one HPSMU and one GNDU (Firmware Version Host 03.05 SM U C 04.06)
	Agilent E5270A/B 8-Slot Precision Measurement Mainframe
	Agilent E5260A 8-Slot High Speed Measurement Mainframe
	Agilent B1500A Semiconductor Parameter Analyzer, Agilent E5288A ASU(Atto-Sense Unit)
	Agilent 4142B Mainframe Modular Dc Source/Monitor
	Keithley 4200 Semiconductor Characterization System
	Keithley 2600A[1] Series Source/Measure Units
	Keithley 237 & 2410 High Voltage Units
Matrix	Agilent E5250A2
	Agilent B2200A2, B2201A2
	Agilent 4085B / 4084B and Controller
	Keithley 707, 708
C-Meter	Agilent B1520 MF CMU (B1500A module)
	Agilent 4284A
	Agilent 4280A C meter / C-V Plotter
	Agilent E4980 Precision LCR Meter (HFCV tests)
	Agilent 4294A (Impedance Analyzer)
	Keithley 4200 CMU module
Pulse Generator	Agilent 8110 / 81110A
	Agilent 8114A
	Agilent B1525A HV SPGU (B1500 module)
	Avtech Very High Speed Pulse Generator Series
DMM	Agilent 3458A Digital Multimeter
Power Supply	Agilent Family
Frequency Counter	Agilent 53131A, 53132A
ARB	Agilent 33250 and 33120 Arbitrary Waveform Generators
	Agilent B1530A WGFMU (B1500 module)
Oscilloscope	Agilent Infinum family
Network Analyzer	Agilent N5230A
Spectrum Analyzer	Agilent E4411B & E4440A Spectrum Analyzers
MISC	Agilent 35670A FFT Dynamic Signal Analyzer
	Agilent 34980A Data Acquisition Mainframe and Modules
	Stanford Research Preamplifier SR5xx Series
	Agilent N1254A-100 or equivalent : SNDU Kelvin adapter
	Omega CN606 & CN612 Series
Thermochuck	Temptronics Series
System	HP 4062UX
	Agilent 41000-400 to -100
Prober	Cascade Series (Summit 1200, S300, or Alessi 6100), SUSS (All semi-automatic models), EG (4080, 4085, 4090, EG5-300), TELL (P8, P12, 78S), UF (90A, 200, 300, 3000), Micromanipulator, all manual probers

[1] Consult with your local sales representative for the latest drivers.

Proven 10th Generation Measurements used Worldwide

ïSDR improves over preceding generations and includes algorithms required for today’s technology development and assessment. The new 10th generation include on-the- fly techniques down to 60 microseconds, provide for DC and AC reliability testing of gate oxides, bias-temperature instability (BTI) as well a solid bedrock of 100 algorithms.

Reliability tests for 60 nm and below are no longer exclusive to the DC domain; AC reliability is vital thus requiring tools that that have the right measurements and support non-traditional resources.

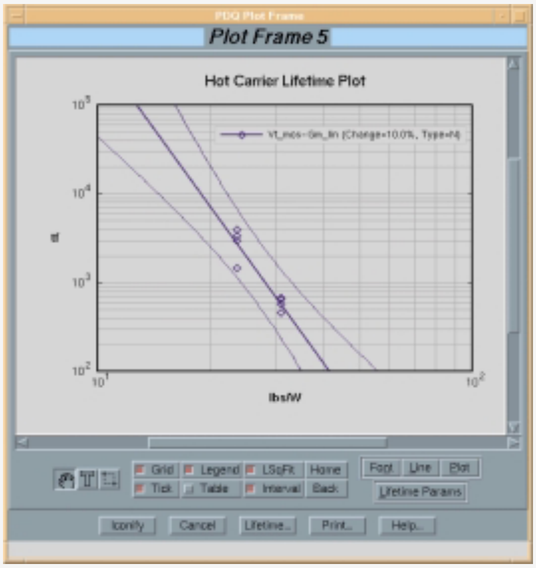
ïSDR can provide immediate feedback on device behavior through the use of its real-time plotting tool. In addition, sophisticated analysis of results is nearly instantaneous through the optional Reliability Data Analyzer, ïRDA.

The current 10th generation ïPDQ-WLR is the answer for reducing development cycle time while helping control maturing processes. For fast identification and prediction of reliability problems at all phases of the IC life cycle — development, qualification, production — ïSDR with ïPDQ-WLR 10 is the proven answer.

Macro tools

In addition to individual algorithms, there are macro tools to facilitate test development:

- HCI Builder to make complex hot carrier test definitions fast and easy. Hot Carrier Injection measurements characterize the degradation of the oxide layer due to repeated electric stress. The HCI Builder allows high level test specifications.
- BTI Builder to select the best parameters and minimize any relaxation effect for Bias Temperature Instability.
- Electromigration test parameters selection and Builders.



Hot Carrier Lifetime Plot

Proven 10th Generation Measurements used Worldwide

MOS

bvdsf_mos
bvdss_mos
bvox_mos
Cap_mos Dbv_mos
Glk_mos
Idasm_mos
Idoff_mos
Ids_mos
Idsr_mos
Isub_mos
Isubmax_mos
R2t_mos
R4t_mos
Sts_mos
Vsnap_mos
Vtl_mos
Vtst_mos

STANDARD

BEM_4_EMR_X
CALC_ID_MOS_XL
CALC_VT_MOS_XL
CONST_I_3_EMR_XL
CONST_I_4_EMR_XL
CPF_4_MOS_XL
CPV_4_MOS_XL
DELTAL_M2F_XL
DOP_2_MOS_XL
DOP_MOS_XL
FASTRES_1_EMR_X
GATE_MOS_XL
HCI_4_MOS_XL
HCI_5_MOS_XL
HCI_6_MOS_XL
HCSTRESS_MOS_XL
HC_LINK_2_MOS_X
HC_LINK_3_MOS_X
HC_LINK_4_MOS_X
HFCV_3_CAP_XL
HFCV_CORR3CAP_X
IDIBIG_2_MOS_XL
IDVD_2_MOS_XL
IDVG_2_MOS_XL
ISO_5_EMR_XL
JRAMP_3_CAP_XL
JTDDB_3_CAP_XL
JTDDB_4_CAP _XL

KELRES_3_EMR_XL
LIFETM_2_MOS_XL
MAXSTRS_MOS_XL
MBLION_SHS_XL
PD_LINK_MOS_XL
STRSMS_2_MOS_XL
STRSMS_3_MOS_XL
STRSMS_4_MOS_XL
SWEAT_3_E_XL
SWEAT_4_EMR
S_2_MOS_XL
S_MOS_XL
TCR_4_EMR_XL
TVP_3_EMR_XL
VRAMP_4_CAP_XL
VTDDB_4_CAP_XL
VT_2_MOS_XL
VT_3_MOS_XL
VT_4_MOS_XL
GET_WLR_FLAG_XL
PDQ_DB_OFF_XL
PDQ_DB_ON_XL
PDQ_TEST_XL
Plot_close_XL
Plot_end_XL
Plot_setup_XL
Plot_xy_XL
READ_CONFIG_XL
SET_TCHUCK_XL
TSREADER_2_XL
TSREADER_XL
Tpldevice_xl
Tpldieinfo_xl
Tpldiepos_xl
Tpl_dietype_xl
Tpllotid_xl
Tplmodule_xl
Tpl_wafer_xl
Tpl_wafername_xl
CPV_4_MOS_XL
DELTAL_M2F_XL
HC_LINK_2_MOS_X
HC_LINK_3_MOS_X
HC_LINK_4_MOS_X
HFCV_3_CAP_XL
HFCV_CORR3CAP_X
IDIBIG_2_MOS_XL
IDVD_2_MOS_XL
IDVG_2_MOS_XL

ISO_5_EMR_XL
JRAMP_3_CAP_XL
JTDDB_3_CAP_XL
JTDDB_4_CAP _XL
STRSMS_2_MOS_XL
STRSMS_3_MOS_XL
STRSMS_4_MOS_XL
SWEAT_3_E_XL
SWEAT_4_EMR
S_2_MOS_XL
S_MOS_XL
TCR_4_EMR_XL
TVP_3_EMR_XL
VRAMP_4_CAP_XL
VTDDB_4_CAP_XL
VT_2_MOS_XL
VT_3_MOS_XL
VT_4_MOS_XL
CONNECT_BTI_XL
DISCONNECT_XL
New_data_file
New_i_date_file
PDQ_TEST_XL
ROSTRESS
STRSMS_4_MOS_XL
STRSMS__I_4_MOS
Today_d
VRAMP_4_CAP_XL
VT_2_MOS_XL
Write_data_line
VT_3_BTI_XL
VT_4_BTI_XL
BTI_3_MOS_XL
BTI_MOS_XL
CONNECT_BTI_XL
CPF_4_BTI_XL
CPV_4_BTI_XL
DOP_2_BTI_XL
IDIBIG_2_BTI_XL
IDVD_2_BTI_XL
OTF_BTI_XL
ROFreq
S_2_BTI_XL
AC_HCI
AC_BTI
AC_TDDB

PARALLEL

PBTI_DEVICE
PBTI_GROUP
PBTI_SETUP
PBTI_TEST
PHCI_DEVICE
PHCI_GROUP
PHCI_SETUP
PHCI_TEST
PVRAMP_CONNECT
PVRAMP_INPUT
PVRAMP_OUTPUT
PVRAMP_SETUP
PVRAMP_SETUP2
PVRAMP_TEST
PVTDDB_DEVICE
PVTDDB_OUTPUT
PVTDDB_SETUP
PVTDDB_TEST
PAC_HCI_BTI
PAC_TDDB

User-Written Algorithms

Creating your own algorithms has never been easier.

Interactive measurement

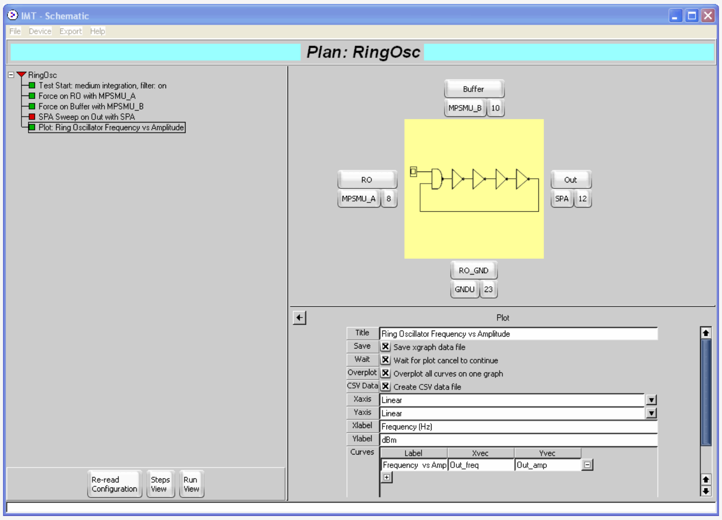
The Interactive Measurement Tool (IMT) provides direct bench-like control of the full test system. It allows a code-free interactive control to quickly perform proof-of concept testing or device verification.
Interactive setups may be saved or exported to C or BASIC language algorithms for direct use, or as the core of a custom algorithm, in automated test plans.

BASIC or C

Users can create algorithms in C or BASIC. For example, to implement proprietary measurement techniques or customize testing for a unique device technology such as NVM HCI.

```
!-------------------------------------------
!-  BODY OF ALGORITHM                      -
!-  WRITTEN BY CUSTOMER                    -
!-------------------------------------------

! StepForce on Gate with HPSMU
Gate_force(1) = Gate_force_0
Gate_force(2) = Gate_force_1
Gate_force(3) = Gate_force_2
FOR Gate_index_ = 1 TO 3
            Gate_frc_ = Gate_force(Gate_index_)
            Gate_frc_str$ = VAL$(Gate_frc_)&” Volts”
            IF Save_csv THEN OUPUT @Csv; “# ***** Gate = “&Gate_frc_str$
            Force_v(Gate, Gate_frc_,0.0,1,0)

            ! Sweep on Drain with MPSMU_A
            Set_iv(Drain,1,0.0,Drain_start,Drain_stop,Drain_stop,
                        Drain_steps,0.0,0.0.1,0.1,1)
            Sweep_iv(Drain,2,0.0,Drain_measure(*), Drain_source(*))

            ! Plot Drain Current vs. Gate Voltage
            IF Plot_on THEN
                        Xgrlen_ = Drain_steps
                        Xgraph_data(“_Gate_force_str”, Drain_source(*),
                        Drain_measure(*), Xgrlen_)
            END IF
NEXT Gate_index_

! Plot Drain Current vs. Gate Voltage
IF Save_csv THEN
            PRINT “ Saving Idvd data to file “, Csv_name$
            GOSUB Writecsvhdr
            ON ERROR GOTO Csvdone
            WHILE 1
                        ENTER @Csv,;Csvline_$
                        OUTPUT @File; Csvline_$
            END WHILE
            Csvdone: !
            OFF ERROR
            Csv_close(@File)
END IF
IF Plot_on THEN
            Xgraph_close(show_xgr, Save_xgr)
END IF
```

User-written BASIC code



RingOsc
- 🟩 Test Start: medium integration, filter: on
- 🟩 Force on RO with MPSMU_A
- 🟩 Force on Buffer with MPSMU_B
- 🟥 SPA Sweep on Out with SPA
- 🟩 Plot: Ring Oscillator Frequency vs Amplitude

Plot

Title: Ring Oscillator Frequency vs Amplitude
Save: ☒ Save xgraph data file
Wait: ☒ Wait for plot cancel to continue
Overplot: ☒ Overplot all curves on one graph
CSV Data: ☒ Create CSV data file
Xaxis: Linear
Yaxis: Linear
Xlabel: Frequency (Hz)
Ylabel: dBm
Curves:

Label	Xvec	Yvec
Frequency vs Amp	Out_freq	Out_amp

Interactive Measurement Tool (IMT)

Direct Execution

Individual algorithms can be executed directly, akin to bench test or prototyping, without spending the time to create a test plan. Any algorithm from the extensive library can be used to test, calculate, or move the prober. Users can sequence their individual execution so they can use values returned from previous algorithms.

An Executive Designed for Test Engineering

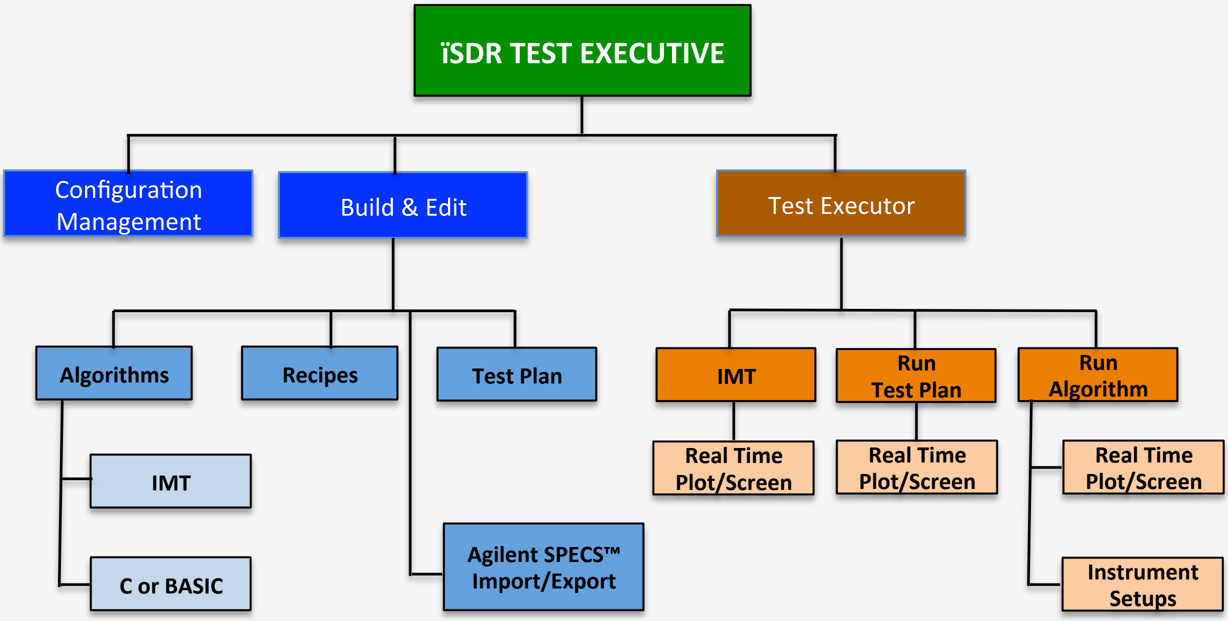
ïSDR provides a high level test executive that orchestrates the development and execution of test plan. Designed to complement the Agilent SPECS test shell, ïSDR offers all the features needed to run a production test environment, but also efficient for quickly designing and executing engineering tests: customizable operator interface, from manual to automatic prober control, automatic data repository including vector data, and seamless interface to optional ïRDA data analyzer.

Users can develop test plans and algorithms using the conventional hierarchy of wafer, die, test, and probe.

Algorithms can also be automatically created using IMT.

Key Features

- Add new and custom test algorithms
- Use of output results from an algorithm as input values for a downstream algorithm.
- Global variables and shell functions as used in Agilent SPECS test shell.
- IMT, HT BASIC and C scripting languages so no compilation necessary.
- Flexible Operation Modes that range from program-less Interactive Execution (IMT), to Individual Algorithm Execution (Algorithm Mode) and to fully Automatic Test Plan Execution (Test Plan Mode)
- Algorithm mode to access prober, tester, and test algorithm libraries (built-in and user defined, translation layer, etc.)
- Manual, Semi and Auto 200, 300 mm and beyond Wafer Probers



One place to enter all Info for ease and simplicity

Data Analysis and Output Format

All data can be output into flat ASCII files or directly exported to excel. Users can also choose to configure the built-in data formatters such that algorithms or shell data can be directly imported into corporate databases.
All ïSDR data is compatible with ïRDA, Reliability Data Analyzer.

Off-line ïSDR

Convenience of development at your desk with an off-line version of ïSDR. All the power of ïSDR except controlling the actual hardware.

ïSDR PC Controller Requirements

Processor	i5
Operating System:	Windows 7/8 Professional
Required Memory:	4 GB
Required Disk Space:	100 GB

USB (2/3) Port for security key
CD Drive to load software
GPIB to control measurement hardware

METAWAFER TECHNOLOGIES sells advanced parallel, characterization, reliability, lifetime and quality estimating solutions for magnetic, semiconductor and nanotechnology devices.

ASSOCIATED PRODUCTS

3500-9000	ïSDR 3.0
3550-9000	ïSDR w/o ïPDQ-WLR
3590-9000	Offline ïSDR 3.0
3500-7100	ïSDR On-site Training
4100-9000	ïRDA 3.0 Analyzer
4100-7100	ïRDA On-site Training
8100-9000	Software Updates
8200-9100	Project Delivery
8200-9200	Consulting
2510-9000	PDQ-WLR (RMB) for SPECS (HP-UX)
2520-9000	PDQ-WLR (C) for SPECS (HP-UX)
2500-7100	PDQ-WLR On-site Training

Product specification and description in this document subject to change without notice.

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