MMWAVE RadarSS Release Notes

1 RadarSS Firmware

RadarSS firmware is responsible for configuring RF/analog and digital front-end in real-time. It also schedules temperature based calibrations. This enables the mm-Wave front-end to be autonomous and capable of adapting itself to handle temperature and ageing effects, and to enable significant ease-of-use.

Version	Type
2.0.0.1	**ROM (256kB)**
1.2.0.3	**Binary (Patch – 32kB)**

1.1 Platform and Device Support

The device and platforms supported with this release include:

Supported Devices	Release Status	Supported EVMs
AWR1243 ES3.0	Release for Production	AWR1243BOOST : AWR1243 ES3.0 Booster pack + MMWAVE-DEVPACK
xWR1443 ES3.0	Release for Production	xWR1443BOOST : xWR1443 ES3.0 Booster pack + MMWAVE-DEVPACK
xWR1642 ES2.0	Release for Production	xWR1642BOOST : xWR1642 ES2.0 Booster pack + MMWAVE-DEVPACK
xWR1843 ES1.0	Release for Characterization	xWR1843BOOST : xWR1843 ES1.0 Booster pack + MMWAVE-DEVPACK

1.2 Memory Requirements

DFP 1.1 onwards RadarSS firmware does not pool 128kB L3 memory from radar cube shared memory for execution. The 32kB internal Patch memory is used on top of 256kB internal ROM, hence memory requirement is NULL for RadarSS.

1.3 Features and enhancements (Compared to DFP 1.0)

- Patch release for xWR1642 ES2.0 and AWR1243 ES3.0 silicon
- Software trigger of sub-frames
- Fixes for RX signal and image band monitor
- Fixes for autonomous periodic calibrations not getting triggered
- Support for 32-bit and 64-bit CRC for async events
- Support for inter-mixing of VCOs within a frame
- Fixes in VCO fault injection
- Fix for inter TX phase mismatches when run time calibration kicks in
- Updated thresholds for DCBIST monitoring based to make the monitoring robust
- Improvements in repeatability performance of TX and RX monitoring

1.4 Features and enhancements (Compared to DFP 1.1)

- Support for boot time TX phase shifter calibration and monitoring of configured phase shift
- API option to allow disabling of PA LDO (used in simultaneous 3 TX use case)
- Support for daisy chain cascade mode
- Support 2048 bit long BPM pattern without the customer requiring to reprogram the chirp configuration RAM
- CQ Monitoring enabled for all 4 profiles
- Added new Die ID read API
- Added Tx Phase shifter calibration LUT override GET and SET API
- Updated dynamic chirp configuration API with new Chirp row select option
- Fixed the available time calculation for calibration/monitoring time for clearing the watch dog based on a fixed percentage of FTTI (instead of fixed percentage of available idle time)
- Fixed the LO distribution bias settings (40G to 80G multiplier bias) was not updated based on temperature LUT
- Fixed the VCO2 control voltage (Max Frequency:81GHz) violating the specification (1.38 V) during run time
- Fixed and enable LPF calibration and monitoring for high IF bandwidth use case
- Improvement in RX LO AMP fault injection effectiveness
- Enabled 20GHz Sync monitoring (for AWR1243 cascade mode)
- Enabled the RX peak detectors and mixer LO power monitoring
- Added short circuit protection enable option in Analog monitoring enable API

- Updated the monitoring threshold of synth VCO LDO DCBIST signal which was indicating false failures
- Enabled boot time IQMM calibration
- TX CLPC performance improvements
- Fixed Noise Figure monitor reporting issue for Pseudo-real Mode
- Fixed an issue with dynamic power save option wen inter-chirp idle time < 10us
- Updated an error check for chirp idle time with digital Hw constraints in profile config API
- SYNTH VCO calibration performance improvements
- Peak Detector calibration performance improvements
- Digital monitoring stability improvements

1.5 Changes in this release (with respect to DFP 1.0)

Item type	Key	Description
Feature	AUTORADAR_REQ-953	Reduce minimum inter-burst time to 200 µs
Feature	AUTORADAR_REQ-938	Support for software trigger of sub-frames
Feature	AUTORADAR_REQ-878	Add an option in device configuration API to support other CRC types for async events
Feature	AUTORADAR_REQ-965	Update reading of external inputs through GPADC to support buffer option (in single shot mode)
Bug	AUTORADAR-1635	Relaxing limits for calibration outputs to avoid false failures
Feature	AUTORADAR-1634	Updating of temperature sensor decoding information on trimmed units
Bug	AUTORADAR-1617	Digital temperature sensor information is not sent to the host
Bug	AUTORADAR-1609	Change VCO control voltage limits in synth calibration and remove the tighter checks on APLL clock frequency
Bug	AUTORADAR-1598	Support per-chirp phase shifter only when the part variant supports 5 degree phase resolution
Bug	AUTORADAR-1583	Race condition in invoking TX task to avoid shared resource problem
Bug	AUTORADAR-1582	BSS was not sending CPU fault and ESM error async events to DSS when the default direction of async events was changed
Bug	AUTORADAR-1558	GPADC reference signal fault injection does not indicate fault is injected
Bug	AUTORADAR-1552	TX Gain Phase and TX BPM monitor does not work

		when all RX are disabled
Bug	AUTORADAR-1550	RF Init calibration status is not cleared before invoking the boot calibration
Bug	AUTORADAR-1547	DFE LBIST fault insertion test isolation removal time increase
Bug	AUTORADAR-1546	ECC Self-test of TCM has DSB instruction missing after corrupting the memory
Bug	AUTORADAR-1545	Periodic static configuration register read back failure
Feature	AUTORADAR-1533	Protection from spurious frame trigger pulses/signals in HW triggered frames
Bug	AUTORADAR-1531	Synth control voltage at 81GHz is crossing 1.3V on 1642 ES2.0
Bug	AUTORADAR-1530	Increase PDLNA gain for incident PD to avoid noisy PD reading for lower gain codes during boot time TX CLPC
Feature	AUTORADAR-1528	Synthesizer calibration status should not indicate updated if the settings are unchanged
Feature	AUTORADAR-1526	Add support for inter-mixing VCOs within the same frame
Bug	AUTORADAR-1525	Update PDLNA Gain vs TX back off table to reduce the possibility of CDS ON < CDS OFF PD measurement
Bug	AUTORADAR-1507	CQ needs to be enabled for IWR part variants
Bug	AUTORADAR-1484	Synth frequency should be measured using DCC after IOBUF LDO and VCO LDO adjustment
Bug	AUTORADAR-1476	AGC SB ESM error observed when boot up DFE STC monitoring is enabled
Bug	AUTORADAR-1472	TX Gain and Phase Monitor not honoring chirp phase value
Bug	AUTORADAR-1465	Additional checks before bias codes for TXs are overwritten with the same back off to avoid phase mismatch
Bug	AUTORADAR-1463	Update GPADC DCBIST monitoring scale factor thresholds
Bug	AUTORADAR-1437	TX loopback monitor phase jumps issue fix
Bug	AUTORADAR-1436	Jumps in inter-TX phase mismatch due to independent run time TX power calibrations
Bug	AUTORADAR-1433	Fix for AGC RAM ECC errors observed when doing DFE STC fault insertion test
Bug	AUTORADAR-1430	Update GPADC DCBIST monitoring thresholds based on IRDROP of external supplies
Bug	AUTORADAR-1429	Fix for RX gain phase monitoring phase imbalance jump issue
Bug	AUTORADAR-1401	Fault Injection API for synth control voltage showing

		different control voltages for Min/max frequencies
Bug	AUTORADAR-1365	RX signal and image band monitor is not working
Bug	AUTORADAR-1364	Periodic calibrations are not triggered due to autonomous calibrations of APLL and synth
Bug	AUTORADAR-1362	Simultaneous 3 TX should be disabled for 1243 and enabled only in 1243P based on device variant

1.6 Changes in this release (with respect to DFP 1.1)

Item type	Key	Description
Feature	AUTORADAR_REQ-999	TX phase shifter calibration (boot- time)
Feature	AUTORADAR_REQ-998	API to support disabling PA LDO in simultaneous 3 TX use case for AWR1243
Feature	AUTORADAR_REQ-969	Support for Daisy Chain cascade mode
Feature	AUTORADAR_REQ-968	Support 2048 bit long BPM pattern without the customer requiring to reprogram the chirp configuration RAM
Feature	AUTORADAR_REQ-964	Support for CQ Monitoring for all 4 profiles
Feature	AUTORADAR_REQ-1003	Provide a TX phase shift calibration override API
Feature	AUTORADAR_REQ-1004	API for Reading DIE ID from the device
Feature	AUTORADAR_REQ-260	20 GHz synch path monitoring
Bug	AUTORADAR-1747	Fixed the available time calculation for calibration/monitoring to clear the watchdog to be a fixed percentage of FTTI instead of a percentage of idle time
Bug	AUTORADAR-1746	Fix for LO distribution bias settings (40G to 80G multiplier bias) not updated based on temperature LUT
Bug	AUTORADAR-1736	Fix for VCO2 control voltage (Max Frequency:81GHz) violates the specification (1.38V) during run time
Feature	AUTORADAR-1717	Enable LPF calibration and monitoring for high IF bandwidth use case
Feature	AUTORADAR-1707	Improvement in RX fault injection effectiveness
Feature	AUTORADAR-1686	Enabled the RX peak detectors in LNA3 output and the mixer LO inputs
Feature	AUTORADAR-1678	Enabled IQMM calibration

Feature	AUTORADAR-1590	TX CLPC performance improvements
Feature	AUTORADAR-1763	Updated Per-chirp BPM control to finish the execution sooner
Feature	AUTORADAR-1825	Updated dynamic chirp configuration API with new Chirp row select option to increase the speed
Bug	AUTORADAR-1856	Fixed an issue with dynamic power save option wen inter-chirp idle time < 10us
Bug	AUTORADAR-1859	Fixed Noise Figure monitor reporting issue for Pseudo-real Mode
Feature	AUTORADAR-1860	IQMM correction is applied for PA loopback chirps to improve phase errors
Bug	AUTORADAR-1896	Updated internal DCBIST thresholds
Bug	AUTORADAR-1881	SYNTH VCO Calibration improvements across temperature
Bug	AUTORADAR-1908	Peak Detectors Calibration improvements across temperature
Bug	AUTORADAR-1924	Fix for Rx gain calibration status shown pass without updating cal data, when it failed due to non-monotonic behavior. This issue will cause IQMM calibrations to fail at -40deg C.
Bug	AUTORADAR-1914	Fix for Latent fault digital monitoring failures observed in some devices in long overnight runs, stability issues.
Bug	AUTORADAR-1917	Fix for When ‘periodic digital monitoring’ is enabled (specifically, register readback test), on some devices, there are occasional failures observed due to DFE STC latent fault test failure.

1.7 Known issues

Key	Description
AUTORADAR-1554	TX gain phase does not work in non-verbose mode (report mode 1 and 2). Users can continue to use report mode 0 for this monitor
AUTORADAR-1555	RX gain phase monitoring does not work in non-verbose mode (report mode 1 and 2). Users can continue to use report mode 0 for this monitor
MMWAVESYS-39	Synthesizer frequency monitor (AWR_MONITOR_SYNTHESIZER_FREQUENCY_CONF_SB) is not

	characterized for performance
MMWAVE_SOC-36	Low power ADC mode should be used on a 5 MHz device variant. Regular ADC mode configuration on a 5 MHz device variant will not be honored by the device and the API will be rejected with an error indication.
MMWAVE_SOC-58	Rampgen parity self-test is generating G2 Rampgen parity error occasionally in long overnight runs, this test has been disabled in this release.
AUTORADAR-1941	BSS FW goes into fault due to register read-back failure for SCI DMA EN, when logger is try to send very small packets of data over UART DMA. There is a race condition of 15 cycles where read back operation can be interrupted by higher priority tasks and by the time the read back is finished, DMA operation done task clearing the SCI DMA EN register and causing read back to fail.
AUTORADAR-1943	AWR_MONITOR_RF_DIG_LATENTFAULT_CONF (Sub block ID - 0x01C0) API is not fully validated across temperature and several power cycles.