

# CC2650 Size Benchmark

February 5, 2018

A benchmark application was created for CC26xx to allow a quick relative comparison of sizes between different kernel and driverlib releases. This application includes a representative set of SYS/BIOS kernel modules and API calls as used in a typical BLE application. This includes the Power management module and its APIs. The application isn't intended to be functional – it includes several Power API calls for no purpose other than to have them linked into the application. Also, the absolute sizes shown aren't meant to be analyzed, but the relative differences from release to release are the focus of this benchmark.

The total Flash and RAM sizes for recent releases are listed in tables below, in reverse chronological order. In each case, the application is built to use the kernel in ROM, and uses the default tool optimizations of that release.

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**coresdk\_cc13xx\_cc26xx\_3\_50\_00\_10\_eng (Build date: February 4, 2018)**

**bios\_6\_55\_00\_02\_eng**

**tidrivers\_full\_3\_50\_00\_12\_eng**

**driverlib\_cc13xx\_cc26xx\_3\_04\_04\_18225a**

**xdctools\_3\_50\_05\_10\_core\_eng**

**IAR tools version: 8.20.2.58**

**TI tools version: 18.1.0.LTS**

**GCC tools version: gcc-arm-none-eabi-7-2017-q4-major**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13731	7401
	Enabled	15173	7401
TI	Disabled	14111	7381
	Enabled	15743	7381
GNU	Disabled	13946	8497
	Enabled	15686	8497

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coresdk\_cc13xx\_cc26xx\_3\_40\_00\_06\_eng (Build date: November 5, 2017)

bios\_6\_53\_00\_11

tidrivers\_full\_3\_40\_00\_08\_eng

driverlib\_cc13xx\_cc26xx\_3\_03\_01\_18037a

xdctools\_3\_50\_03\_33\_core\_eng

IAR tools version: 8.11.3.53

TI tools version: 16.9.6.LTS

GCC tools version: gcc-arm-none-eabi-6-2017-q1-update

	RCOSC Calibration	Flash	RAM
IAR	Disabled	13416	7401
	Enabled	14866	7401
TI	Disabled	14589	7397
	Enabled	16217	7397
GNU	Disabled	13992	8497
	Enabled	15816	8497

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coresdk\_cc13xx\_cc26xx\_3\_30\_00\_07\_eng (Build date: July 29, 2017)

bios\_6\_52\_00\_07\_eng

tidrivers\_full\_3\_30\_00\_10\_eng

driverlib\_cc13xx\_cc26xx\_3\_01\_03\_17842

xdctools\_3\_50\_02\_20\_core\_eng

IAR tools version: 8.11.1.47

TI tools version: 16.9.3.LTS

GCC tools version: gcc-arm-none-eabi-6-2017-q1-update

	RCOSC Calibration	Flash	RAM
IAR	Disabled	13364	7401
	Enabled	14818	7401
TI	Disabled	14521	7397
	Enabled	16149	7397
GNU	Disabled	13999	8505
	Enabled	15825	8505

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**coresdk\_cc13xx\_cc26xx\_3\_20\_00\_13\_eng (Build date: May 3, 2017)**

**bios\_6\_51\_00\_08\_eng**

**tidrivers\_full\_3\_20\_00\_13\_eng**

**driverlib\_cc13xx\_cc26xx\_3\_01\_00\_17751**

**xdctools\_3\_50\_02\_18\_core\_eng**

**IAR tools version: 8.11.1.47**

**TI tools version: 16.9.3.LTS**

**GCC tools version: gcc-arm-none-eabi-6-2017-q1-update**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13297	7401
	Enabled	14755	7401
TI	Disabled	14493	7397
	Enabled	16121	7397
GNU	Disabled	13874	8497
	Enabled	15700	8497

Changes in this release known to significantly affect size:

- Usage of Driver Porting Layer (DPL) to enable usage with other RTOS or no-RTOS
- New toolchain versions for IAR, TI, GNU
- GNU now using newlib-nano

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**coresdk\_cc13xx\_cc26xx\_3\_10\_00\_05\_eng (Build date: February 5, 2017)**

**bios\_6\_50\_00\_05\_eng**

**tidrivers\_full\_3\_10\_00\_09\_eng**

**driverlib\_cc13xx\_cc26xx\_3\_00\_03\_17619**

**xdctools\_3\_50\_00\_08\_core\_eng**

**IAR tools version: 7.80.1**

**TI tools version: 16.9.0**

**GCC tools version: gcc-arm-none-eabi-4\_9-2015q3**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13146	7391
	Enabled	14454	7391
TI	Disabled	14341	7385
	Enabled	15865	7385
GNU	Disabled	15456	9625
	Enabled	17196	9625

Changes in this release known to significantly affect size:

- Default system stack size is now 1024 bytes for each toolchain; was previously 2048 for TI and IAR, and 1024 for GNU
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coresdk\_cc13xx\_cc26xx\_3\_01\_00\_07\_eng (Build date: October 22, 2016)

bios\_6\_46\_02\_44\_eng

drivers\_3\_01\_00\_07\_eng

ccware\_cc13xx\_cc26xx\_1\_00\_00\_17405

xdctools\_3\_32\_01\_22\_core

IAR tools version: 7.60.1

TI tools version: 16.9.0

GCC tools version: gcc-arm-none-eabi-4\_9-2015q3

	RCOSC Calibration	Flash	RAM
IAR	Disabled	13039	8375
	Enabled	14344	8375
TI	Disabled	14317	8369
	Enabled	15841	8369
GNU	Disabled	16040	9581
	Enabled	17788	9581

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tirtos\_2\_20\_00\_01\_eng (Build date: June 8, 2016)

bios\_6\_46\_00\_22\_eng

drivers\_2\_20\_00\_03\_eng

cc26xxware\_2\_24\_02\_17202

xdctools\_3\_32\_00\_06\_core\_eng

IAR tools version: 7.50

TI tools version: 5.2.5

	RCOSC Calibration	Flash	RAM
IAR	Disabled	13102	8375
	Enabled	14385	8375
TI	Disabled	14757	8407
	Enabled	16337	8407
GNU	Disabled	17764	9856
	Enabled	19484	9856

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**tirtos\_2\_16\_01\_12\_eng (Build date: April 19, 2016)**

**bios\_6\_45\_02\_30\_eng**

**drivers\_2\_16\_01\_12\_eng**

**cc26xxware\_2\_23\_02\_16941**

**xdctools\_3\_32\_00\_06\_core\_eng**

**IAR tools version: 7.50**

**TI tools version: 5.2.5**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	12892	8395
	Enabled	14143	8395
TI	Disabled	14838	8443
	Enabled	16402	8443

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**tirtos\_2\_16\_00\_00\_eng (Build date: January 25, 2016)**

**bios\_6\_45\_01\_23\_eng**

**drivers\_2\_16\_00\_00\_eng**

**cc26xxware\_2\_23\_01\_16606**

**xdctools\_3\_32\_00\_06\_core\_eng**

**IAR tools version: 7.50**

**TI tools version: 5.2.5**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	12914	8395
	Enabled	14161	8395
TI	Disabled	14798	8443
	Enabled	16354	8443

Changes in this release known to affect size:

- Driverlib size increases (chipinfo.o, osc.o, adi.o, setup.o)
  - Improvements for RCOSC calibration
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tirtos\_2\_15\_00\_12\_eng (Build date: December 3, 2015)

bios\_6\_45\_00\_16\_eng

drivers\_2\_15\_00\_21\_eng

cc26xxware\_2\_23\_00\_16374

xdctools\_3\_32\_00\_01\_core\_eng

IAR tools version: 7.50

TI tools version: 5.2.2

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	12841	8395
	Enabled	13972	8395
TI	Disabled	14744	8443
	Enabled	16196	8443

Changes in this release known to affect size:

- Newer IAR tools

- Driverlib function HapiTrimDeviceShutdown() Flash increased by 102/100 bytes for IAR/TI

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**Note: With the move of the Power module from the kernel module to a TI-RTOS driver in TI-RTOS 2.15.00, the benchmark application is now being built as a full TI-RTOS application. The table immediately below shows the sizes for the new application.**

tirtos\_2\_15\_00\_07\_eng (Build date: November 11, 2015)

bios\_6\_45\_00\_11\_eng

drivers\_2\_15\_00\_10\_eng

cc26xxware\_2\_22\_01\_16290

xdctools\_3\_31\_01\_33

IAR tools version: 7.40.1a

TI tools version: 5.2.2

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13028	8375
	Enabled	14075	8375
TI	Disabled	14644	8427
	Enabled	15968	8427

Changes in this release known to affect size:

- Driverlib libraries for TI are now built to optimize for size (as has been the case for IAR)

Note: The benchmark application was improved for the bios\_6\_42\_03 release, with the following changes:

- The application now uses the aggressive Standby power policy, versus a single explicit call to Power\_sleep()
- Calls to Power\_shutdown(), Power\_getTransitionState(), and Power\_getXoscStartupTime() are now included
- The SysCallback System provider is now used, to eliminate debugger I/O support
- System stack sizes are now equalized (previously the system stack for IAR was 2K, versus 1K for TI)

The table immediately below shows the sizes for the new application and the new kernel and driverlib releases. The next table below that shows for comparison purposes the sizes using the new benchmark application, with the previous kernel and driverlib releases.

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bios\_6\_42\_03\_32 (Build date: October 5, 2015)

xdctools\_3\_31\_01\_33

cc26xxware\_2\_22\_00\_16101

	RCOSC Calibration	Flash	RAM
IAR	Disabled	13024	8331
	Enabled	14082	8387
TI	Disabled	15052	8375
	Enabled	16252	8431

Changes in this release known to affect size:

- Use the LF clock source to determine the startup delays for enabling the LF clock qualifiers (SDOCM00119402)
- Driverlib enhancements, including new functions for clock loss event control, and adding temperature compensation for VDDR sleep trim.

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bios\_6\_42\_02\_24 (Build date: August 4, 2015)

xdctools\_3\_31\_01\_33

cc26xxware\_2\_21\_03\_15980

	RCOSC Calibration	Flash	RAM
IAR	Disabled	12781	8331
	Enabled	13842	8387
TI	Disabled	14748	8375
	Enabled	15952	8431



**Note: The following tables show earlier comparisons, using the earlier size benchmark application, with earlier kernel and driverlib releases.**

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**bios\_6\_42\_02\_24 (Build date: August 4, 2015)**

**xdctools\_3\_31\_01\_33**

**cc26xxware\_2\_21\_03\_15980**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13287	8123
	Enabled	14352	8179
TI	Disabled	17254	7667
	Enabled	18458	7723

Changes in this release known to affect size:

- No longer use Clock\_stop() from ROM; use new enhanced function that can trigger immediate reschedule of next tick (SDOCM00117544)
- Support VIMS RAM as GPRAM (SDOCM00117547)

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**bios\_6\_42\_01\_15 (Build date: June 19, 2015)**

**xdctools\_3\_31\_01\_33**

**cc26xxware\_2\_21\_02\_15830**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13267	8091
	Enabled	14341	8147
TI	Disabled	17170	7635
	Enabled	18374	7691

Changes in this release known to affect size:

- Reworked RCOSC calibration to reduce interrupt latency (SDOCM00115902)
  - Optimizations for cc26xx and cc13xx should favor size (SDOCM00116205)
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**bios\_6\_42\_00\_07 (Build date: April 30, 2015)**

**xdctools\_3\_31\_01\_33**

**cc26xxware\_2\_21\_01\_15600**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	13520	8035
	Enabled	14418	8091
TI	Disabled	18098	7583
	Enabled	19474	7635

Changes in this release known to affect size:

- Removed PG1, PG2.0, and PG2.1 workarounds
- Removed backdoor recovery mechanism
- Eliminate all RSOSC calibration code when the feature is disabled

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**bios\_6\_41\_02\_41 (Build date: February 9, 2015)**

**xdctools\_3\_30\_06\_67**

**cc26xxware\_2\_20\_06\_14829**

	<b>RCOSC Calibration</b>	<b>Flash</b>	<b>RAM</b>
IAR	Disabled	14173	8063
	Enabled	15201	8087
TI	Disabled	18310	7611
	Enabled	19386	7635