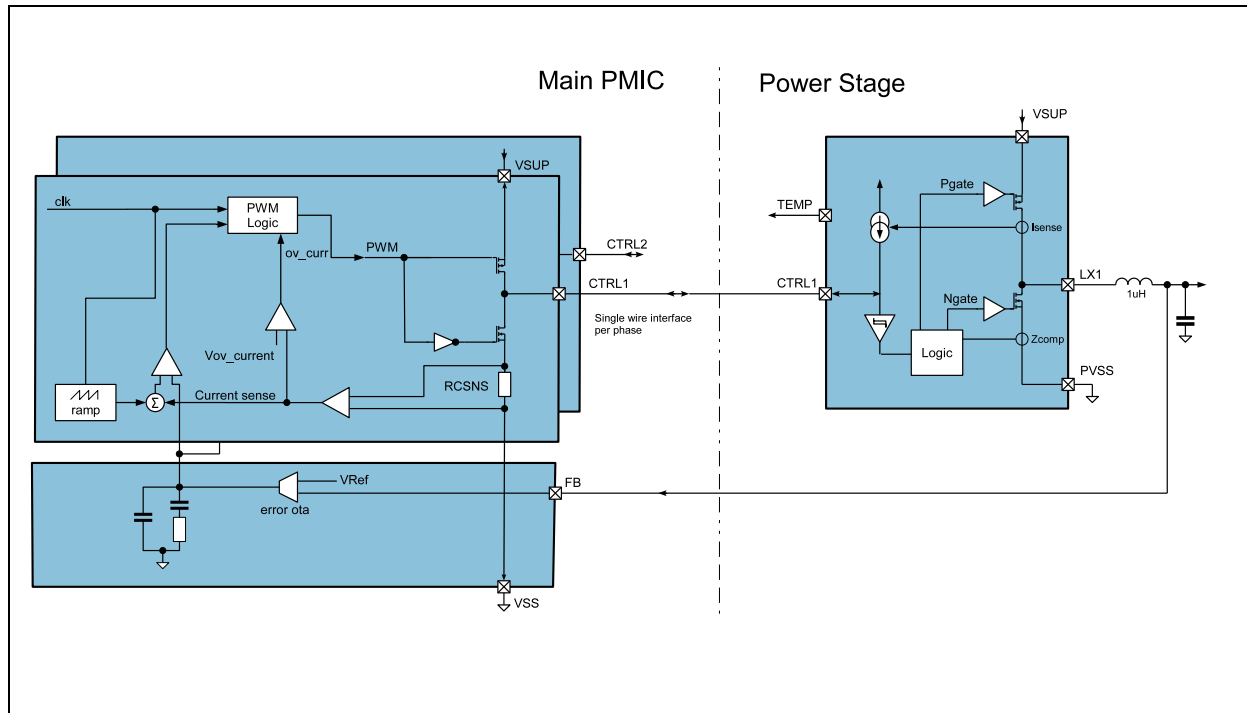


Block Diagram

The functional blocks of this device for reference are shown below:

Figure 2: AS3729 Block Diagram



AS3729 Block Diagram: This figure shows the block diagram of the DCDC controller inside the Main PMIC and the AS3729 Power Stage with all relevant system components.

Pin Assignment

Figure 3:
Pin Diagram

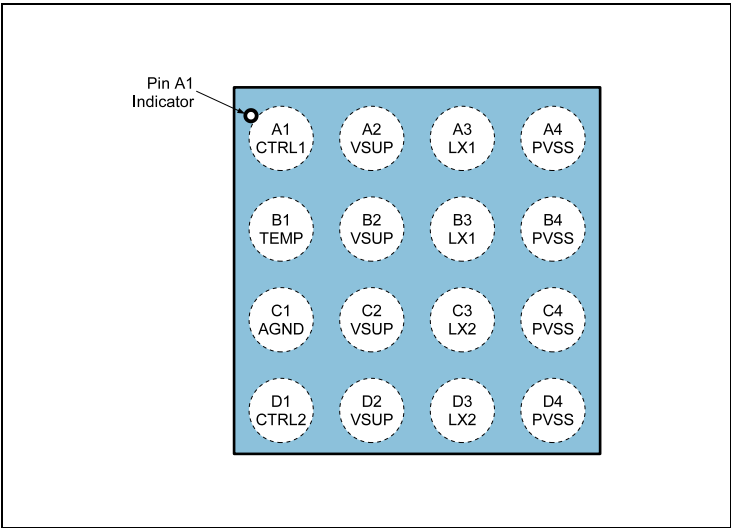


Figure 4:
Pin Description

Pin Number	Pin Name	Description
A1	CTRL1	Control IO for phase 1
B1	TEMP	ON/OFF control and temperature feedback
C1	AGND	Analog ground
D1	CTRL2	Control IO for phase 2
A2, B2	VSUP	Phase 1 positive supply terminal
C2, D2	VSUP	Phase 2 positive supply terminal
A3, B3	LX1	Phase 1 switching output to coil
C3, D3	LX2	Phase 2 switching output to coil
A4, B4	PVSS	Phase 1 negative supply terminal
C4, D4	PVSS	Phase 2 negative supply terminal

Absolute Maximum Ratings

Stresses beyond those listed under [Absolute Maximum Ratings](#) may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated under [Electrical Characteristics](#) is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Figure 5:
Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Units	Comments
Electrical Parameters					
	Supply voltage to ground 5V pins	-0.5	7.0	V	Applicable for pins VSUPx, LXx, CTRLx
	Supply voltage to ground 3V pins	-0.5	5.0	V	Applicable for pin TEMP
	Voltage difference between ground terminals	-0.5	0.5	V	Applicable for pins PVSS, AGND
	Input current (latch-up immunity)	-100	100	mA	Norm: JEDEC JESD78
Continuous Power Dissipation (T _A = 70°C)					
P _T	Continuous power dissipation		1	W	P _T ⁽¹⁾ for WL-CSP16 package (R _{THJA} ~ 55K/W)
Electrostatic Discharge					
ESD	Electrostatic discharge HBM	±1.5		kV	Norm: JEDEC JESD22-A114F
Temperature Ranges and Storage Conditions					
T _A	Operating temperature	-40	85	°C	
R _{THJA}	Junction to ambient thermal resistance			°C/W	R _{THJA} typical 55K/W
T _J	Junction temperature		125	°C	
T _{Strg}	Storage temperature range	-55	125	°C	
T _{BODY}	Package body temperature		260	°C	Norm IPC/JEDEC J-STD-020 ⁽²⁾
RH _{NC}	Relative humidity (non-condensing)	5	85	%	
MSL	Moisture sensitivity level	1			Represents an unlimited floor life time

Note(s) and/or Footnote(s):

1. Depending on actual PCB layout and PCB used.
2. The reflow peak soldering temperature (body temperature) is specified according IPC/JEDEC J-STD-020 "Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices".

Electrical Characteristics

Typical values are at $V_{SUP} = 3.8V$, $T_A = 25^{\circ}C$ (unless otherwise specified). All limits are guaranteed. The parameters with Min and Max values are guaranteed with production tests or SQC (Statistical Quality Control) methods.

Figure 6:
Step Down DCDC Power Stage Parameters

Symbol	Parameter	Comments	Min	Typ	Max	Units
V_{IN}	Input voltage	Pin VSUPx	2.5		5.5	V
		Pin CTRLx	0		5.5	V
		Pin TEMP	0		3.6	V
I_{LIMIT}	Peak coil current limit	Single phase			4	A
I_{LOAD}	Load current	Continuous load current	0		2.5	A
		Peak load current			3 ⁽¹⁾	
R_{PMOS}	P-switch On resistance ⁽²⁾	Single phase		40	70	mΩ
R_{NMOS}	N-switch On resistance ⁽²⁾	Single phase		30	50	mΩ
f_{SW}	Switching frequency	Supplied by DCDC controller		2.7	3	MHz
$I_{Q_force_PWM}$	Quiescent current PWM	TEMP pin high, force PWM mode active		6.2		mA
$I_{Q_low_power}$	Quiescent current LP	TEMP pin high, low power mode active		21		μA
I_{power_off}	Power-Off current	No current into pin TEMP		±1		μA
$R_{discharge}$	active discharge	Single phase		16		Ω

Note(s) and/or Footnote(s):

1. Maximum value only for pulsed peak current.
2. MOS transistor only without package parasitics.

Figure 7:
Step Down DCDC Power Stage External Components

Symbol	Parameter	Min	Typ	Max	Units	Note
External Components Per Phase						
C_{FB}	Output capacitor	40	47		μF	Ceramic X5R or X7R, high performance
		20	22		μF	Ceramic X5R or X7R, cost optimized
C_{VSUP}	Input capacitor	6	10		μF	Ceramic X5R or X7R
L	Inductor	0.3	0.47		μH	3A rated, 3MHz operation, low R_{ON}

Parameters

Figure 8:
3.7V Efficiency vs. Output Current Combined Mode

AS3729 Step Down DCDC: Shows the Efficiency of AS3729 with $V_{SUP} = 3.7V$, 1.5MHz operation, $T_A = 25^\circ C$ and Coilcraft XAL5030-601MEB coil

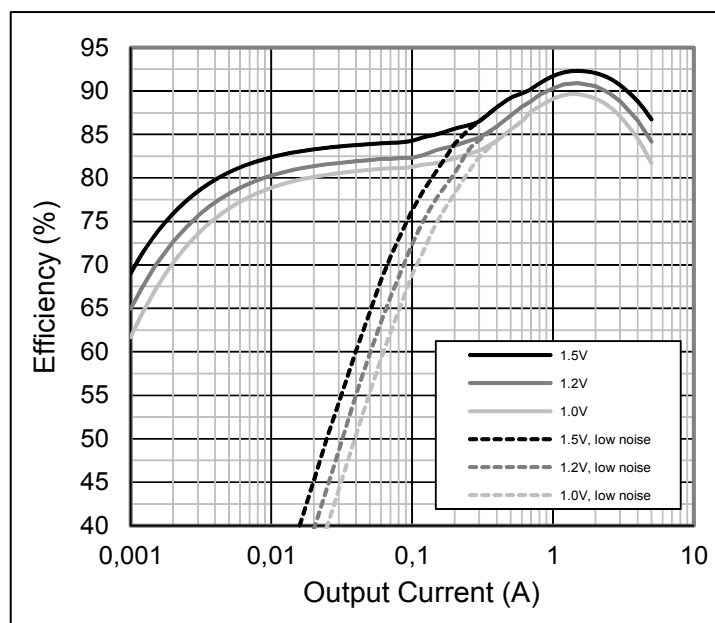


Figure 9:
3.7V Efficiency vs. Output Current Coil Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 for different coils @ 1.0V with $V_{SUP}=3.7V$, 1.5MHz operation and $T_A=25^{\circ}C$.

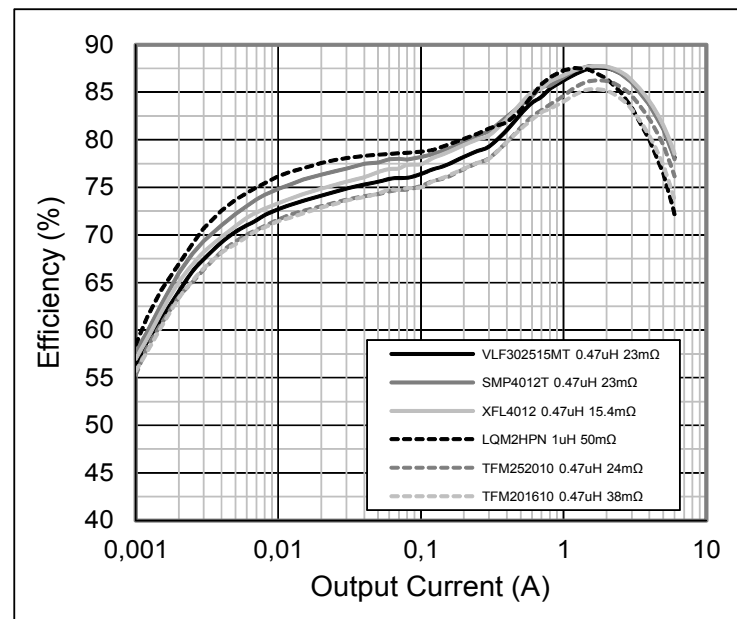


Figure 10:
3.7V Efficiency vs. Output Current Coil Comparison
Combined Mode

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 for different coils @ 1.0V with $V_{SUP}=3.7V$, 1.5MHz operation and $T_A=25^{\circ}C$.

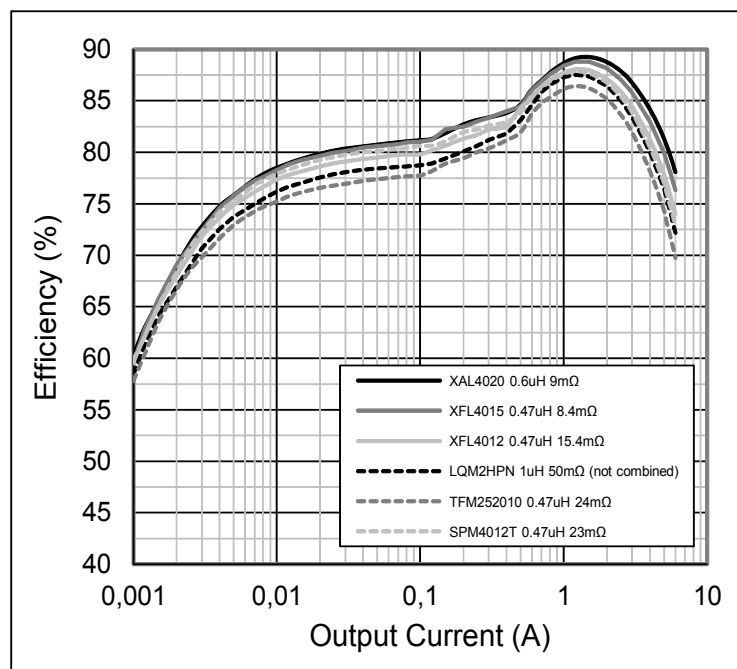


Figure 11:
5.0V Efficiency vs. Output Current Coil Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 for different coils @ 1.0V with $V_{SUP}=5.0V$, 1.5MHz operation and $T_A=25^{\circ}C$.

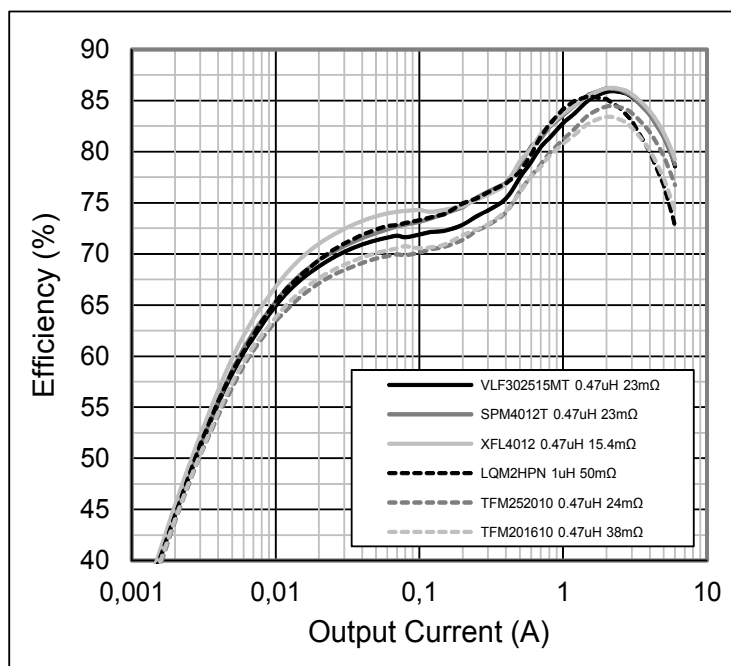


Figure 12:
5.0V Efficiency vs. Output Current Coil Comparison
Combined Mode

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 for different coils @ 1.0V with $V_{SUP}=5.0V$, 1.5MHz operation and $T_A=25^{\circ}C$.

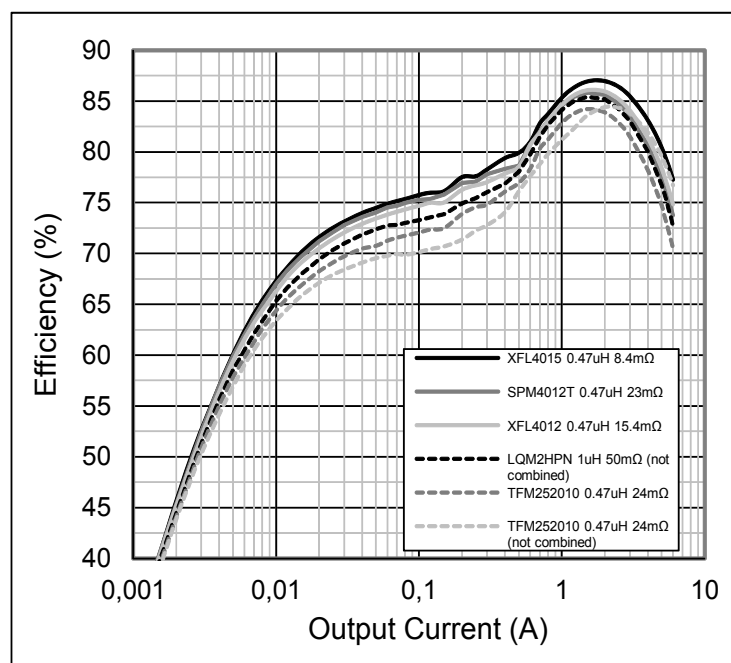


Figure 13:
3.7V Efficiency vs. Output Current XFL4012 Mode Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 in dual, combined and single phase mode @ 1.0V with $V_{SUP}=3.7V$, 1.5MHz operation, $T_A=25^{\circ}C$ and Coilcraft XFL4012-471MEB coil.

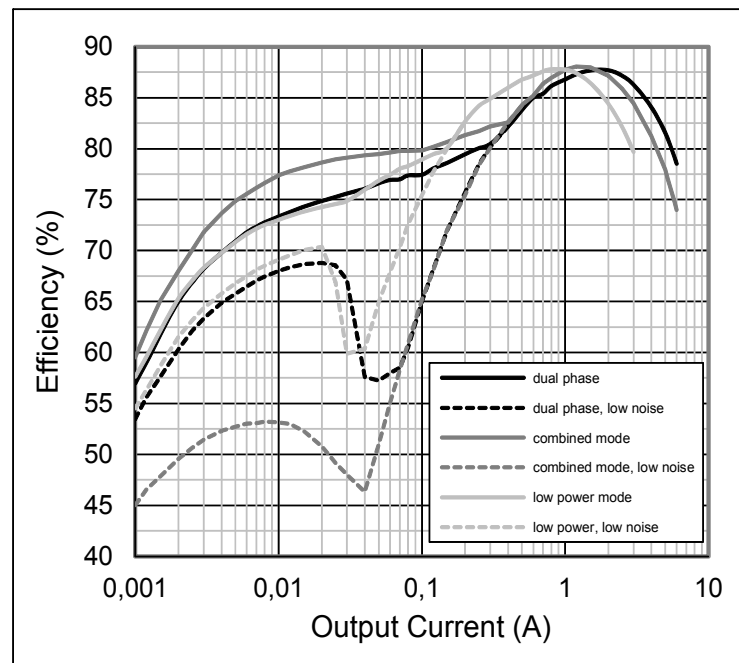


Figure 14:
3.7V Efficiency vs. Output Current SPM4012T Mode Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 in dual, combined and single phase mode @ 1.0V with $V_{SUP}=3.7V$, 1.5MHz operation, $T_A=25^{\circ}C$ and TDK SPM4012T-R47M coil.

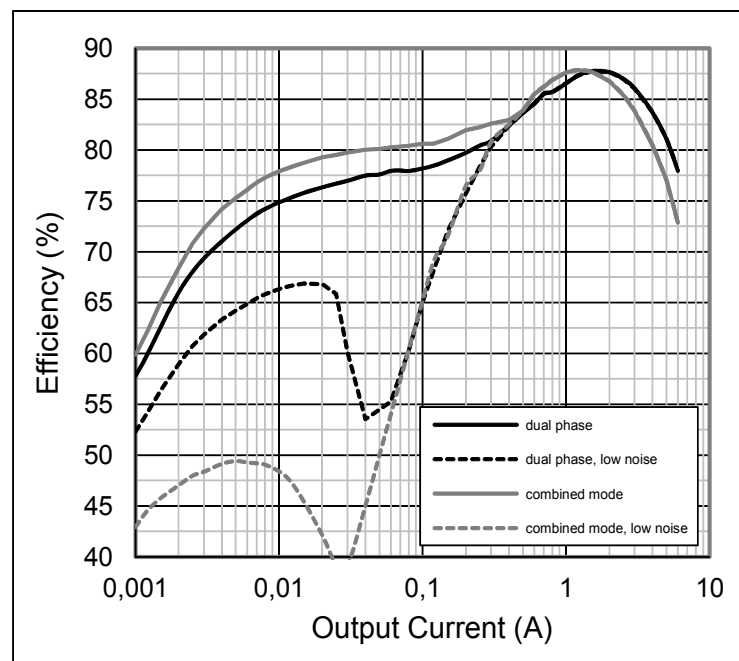


Figure 15:
3.7V Efficiency vs. Output Current TFM252010 Mode Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 in dual, combined and single phase mode @ 1.0V with $V_{SUP}=3.7V$, 1.5MHz operation, $T_A=25^{\circ}C$ and TDK TFM252010A-R47M coil.

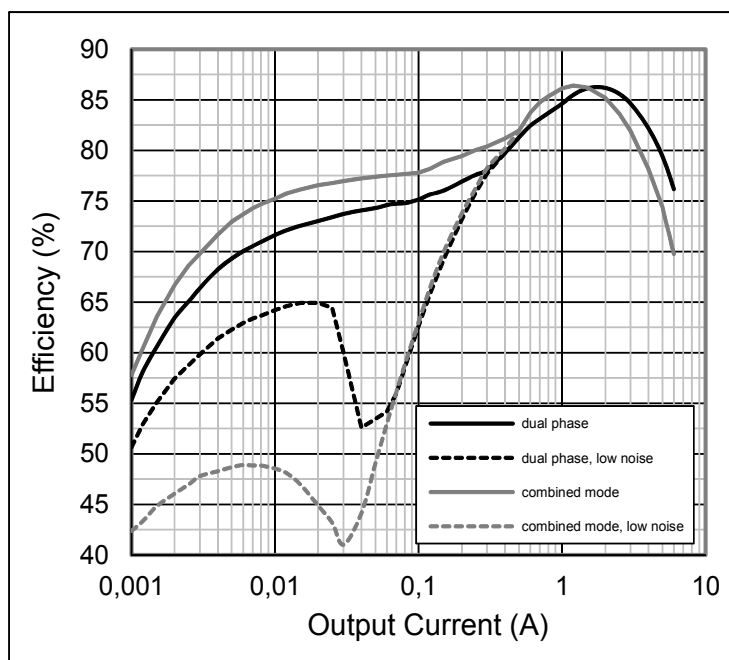


Figure 16:
3.7V Efficiency vs. Output Current XFL4012 Frequency Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 in dual phase mode @ 1.0V with $V_{SUP}=3.7V$, $T_A=25^{\circ}C$ and Coilcraft XFL4012-471MEB coil.

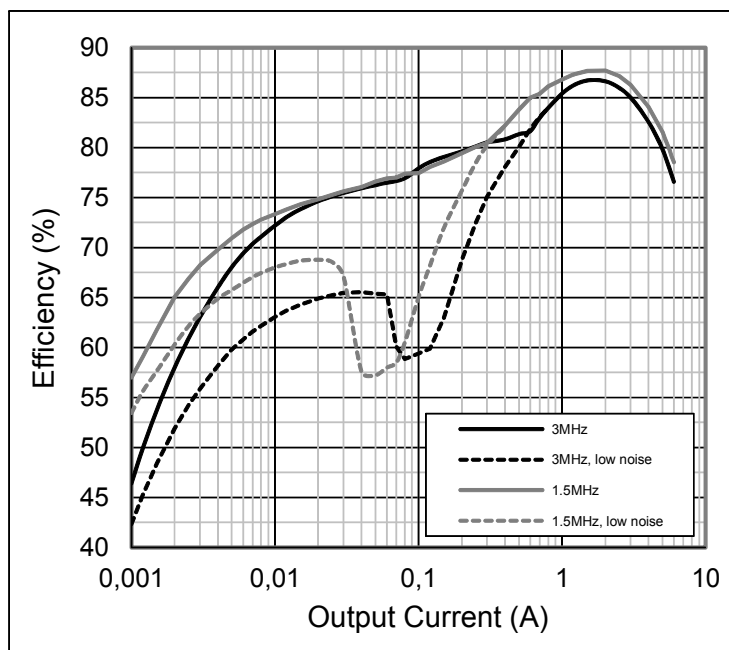
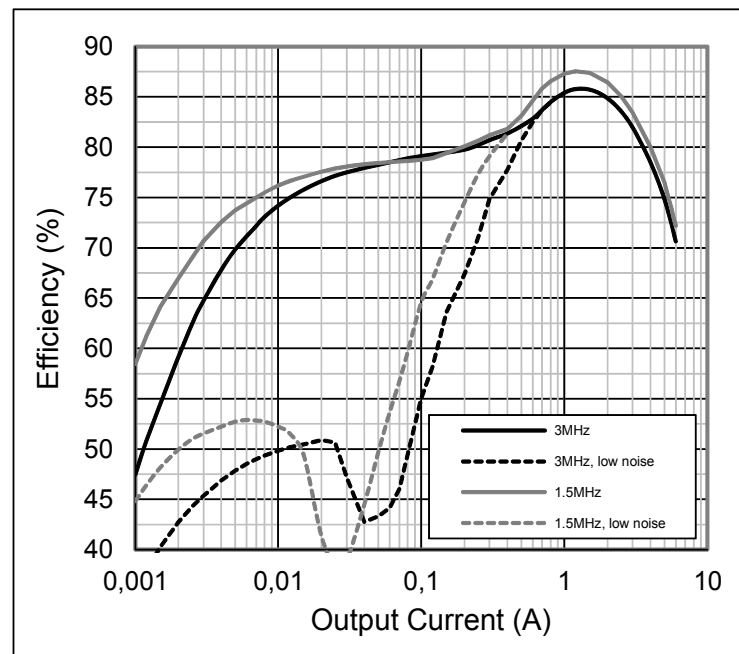


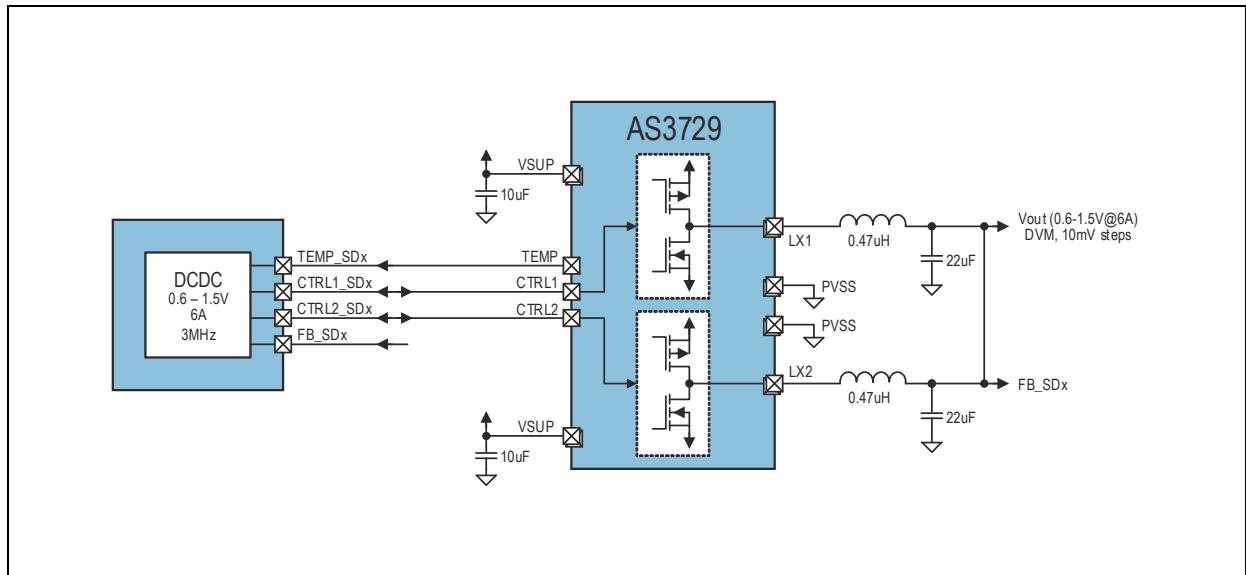
Figure 17:
3.7V Efficiency vs. Output Current LQMHPN Frequency Comparison

AS3729 Step Down DCDC: Shows the Efficiency of the AS3729 in dual phase mode @ 1.0V with $V_{SUP}=3.7V$, $T_A=25^{\circ}C$ and Murata LQM2HPN1R0MJH coil.



Application Information

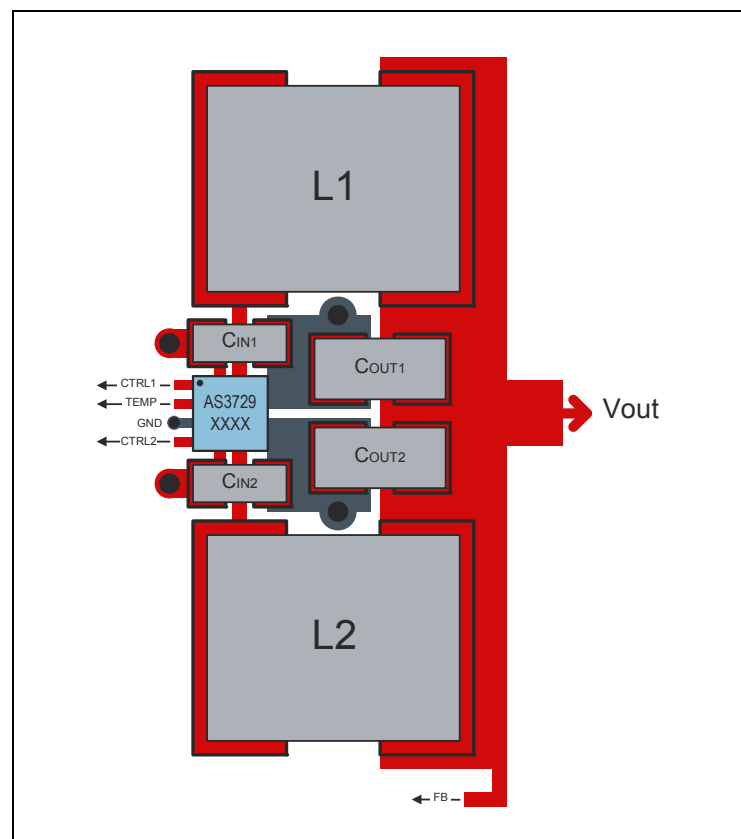
Figure 18:
Typical Application Circuit



AS3729 Typical Application: This figure shows the connection of the DCDC controller and the AS3729 Power Stage.

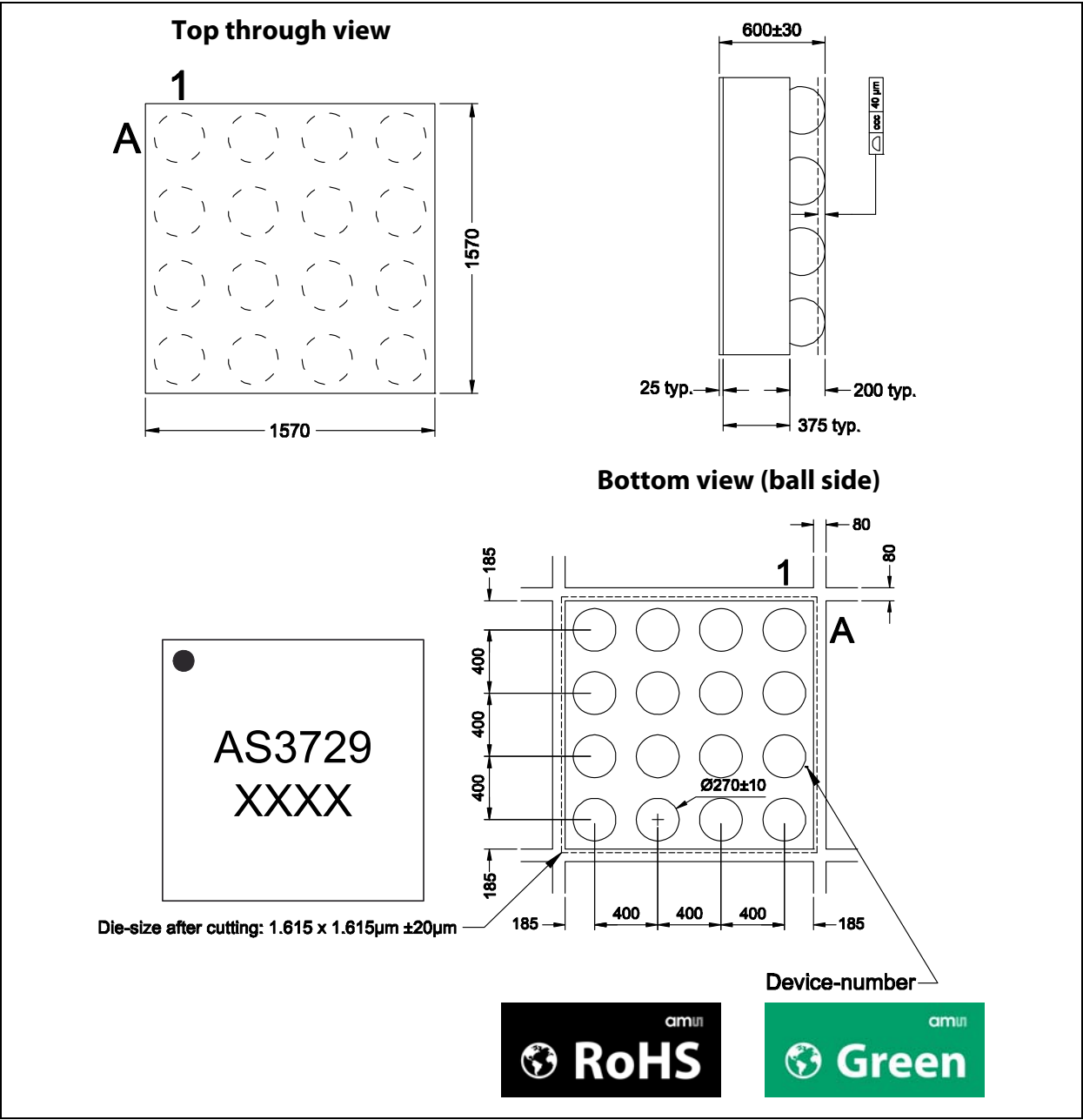
Figure 19:
Layout Guidelines

Layout Guidelines: This figure shows the recommended layout and placement of the external components for the 2-phase AS3729 Power Stage.



Package Drawings & Markings

Figure 20:
16-pin WL-CSP with 0.4mm Pitch



Note(s) and/or Footnote(s):

- 1. ccc Coplanarity.
- 2. All dimensions in µm.

Figure 21:
Package Code

XXXX
Tracecode

Ordering & Contact Information

Figure 22:
Ordering Information

Ordering Code	Description	Delivery Form	Package	Delivery Quantity
AS3729-BWLT	Power stage for multi-phase DCDC	Tape & Reel	16-pin WL-CSP	12000
AS3729-BWLM	Power stage for multi-phase DCDC	Tape & Reel	16-pin WL-CSP	500

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Revision Information

Changes from 1-22 (2013-Aug) to current revision 1-24 (2015-Aug-13)	Page
1-22 (2013-Aug) to 1-23 (2015-Aug-11)	
Content was updated to the latest ams design	
Updated Figure 5	4
Updated Figure 6	5
Updated Figure 7	6
Updated titles of figures 8, 10, 12, 13 & 17	6 - 11
Updated Figure 18	12
Updated Figure 22	14
1-23 (2015-Aug-11) to 1-24 (2015-Aug-13)	
Updated Figure 21	13

Note(s) and/or Footnote(s):

1. Page and figure numbers for the previous version may differ from page and figure numbers in the current revision.
2. Correction of typographical errors is not explicitly mentioned.

Content Guide

1	General Description
1	Key Benefits & Features
1	Applications
2	Block Diagram
3	Pin Assignment
4	Absolute Maximum Ratings
5	Electrical Characteristics
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