SILICON SUPPORT MAGNETICS

Compatibility guide

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1. INTRODUCTION

There are many silicon IC vendors supplying switching converter IC's for a range of applications that require an inductor as the critical energy transfer part of the circuit. The selection of the inductor is as critical, maybe more so, than the IC itself, as this is where the energy transfer the IC is controlling is produced, and where the voltage is effectively stepped up (e.g. 5V input to 12V output) or stepped down (e.g. 5V input to 1V output), or even inverted, and the inductor can ultimately determine the current transfer as well as the voltage change.

Applications for inductive elements in switching regulators are not confined to just power conversion but have extended to specific targeted applications such as LED lighting, LCD drivers and amplifier bias compensation. However, the bulk is still for relatively straight-forward voltage conversion in a non-isolated point-of-load situations where a different power rail is needed for a specific circuit requirement.

Murata provide a range of inductors in different form factors to suit almost all conceivable applications, however, some are better suited than others to match with specific IC's. This document provides a guide to an extensive range of commercially available IC's and the inductor best suited to complete the application as shown in the IC vendors datasheet for their part. While the list is extensive, new ICs are produced regularly and old ones are obsoleted, hence if the reader wishes to use an IC not covered here and would like advice and the part added, please get in touch. Similarly, if a reader spots an IC we still have listed that has become obsolete, feel free to update us as appropriate. Contact details are available on the Murata website (www.murata.com)

2. SELECTION OF INDUCTORS FOR SWITCHING REGULATORS

The IC vendors in their datasheets provide a guide on how to select an inductor for each IC. In general, the inductance value provides the voltage conversion ratio, but is dependant on the frequency of operation and current required. Some ICs also regulate their switching to accommodate a wide range of inductance values. Presented here are the best fit to the application notes that the IC suppliers provide, hence the best "first attempt" for any other circuit configuration. If the chosen inductor here is not the best fit for the conversion the reader requires, the series suggested most likely provides a narrowing of the options and a value close to the one shown from the same series of inductors is most likely the one to choose. Hence while we cannot provide the solution to every combination of input and output voltage for every IC, the list gives a starting point and should help the reader arrive more rapidly at the correct inductor for their specific application.

3. GUIDELINES FOR INDUCTOR SELECTION

INDUCTANCE VALUE

While the IC datasheet should be consulted for calculation of the inductance value, it should be remembered that an exact value is unlikely to be available and the next closest in the range should be chosen (e.g. if the calculation suggests 44µH, most likely a 47µH will suffice).

SATURATION CURRENT

The value for saturation current provided in the datasheet should always be higher than the current delivered to the output. In general, at the initial switch-on a larger current will flow and can saturate the inductor for the first few cycles (typically less than 3-cycles), before normal regulation control is achieved (unless the IC has a soft start or ramped output control). In general, the saturation current should be 1.5x to 3x the required supply current. It should also be noted that the inductor saturation may not be a problem per se for these first few cycles and the value provided is for only a 10% drop in inductance for Murata parts.

SELF RESONANT FREQUENCY

The self-resonant frequency (SRF) of an inductor should always be much higher than the switching frequency of the switching IC. In general, this is again not an issue, but as IC switching is getting faster since this can be a way to reduce inductance value and size, the frequency and/or switch edges from the IC may get close to the SRF and this will increase losses. An SRF of at least 5x-10x the switching frequency is a relatively safe margin to apply.

DC RESISTANCE

In general, the lower the value, the lower the loss, however, most wire-wound inductor have a relatively low DC resistance and this is a parameter that is often over considered. Lower DC resistance comes from thicker wire gauges, which generally may have higher AC losses, particularly if the frequency of switching is in the MHz region, hence there may be a trade off and unless switching currents are in excess of 3A most inductor DC resistance loss has a minimal impact on overall efficiency.

SIZE

Most inductors are selected for the above parameters and size is not always a consideration, but for some circuits height may be an issue (e.g. plug-in card and rack systems), whereas in other PCB area may be at a premium. Consequently, the choice of inductor may be constrained by available space within the final enclosure. In the tables provided here, most of the thinner, low profile IC packages have been paired with smaller, low profile inductors, however, if size is not a critical factor it may be possible to find a larger, lower DC resistance and higher current part that is preferrable for the readers application.

ANALOG DEVICES INC.

Family	Murata Power Solutions		
	Series	Part number	IC type
LT1109	2200R	22R333C	Step-Up
LT1300	2600	26100C	Step-Up
LT1301/2	1800R	18R333C	Step-Up
LT1303/4	1800	18223C	Step-Up
LT1305/6	1800R	18R103C	Step-Up
LT1317	2600	26S100C	Step-Up
LT1370	1800R	18R472C	Step-Up
LT1371	1300	13R103C	Step-Up
LT1372	2700	27103C	Step-Up
LT1374	1900R	19R472C	Step-Down
LT1375/6	2900	29472C	Step-Down
LT1377	2300	23S4R7C	Step-Up
LT1576	2600	26S150C	Step-Down
LT1578	2600	26S150C	Step-Down
LT1610	8400	84472C	Step-Up
LT1611	2700T	27T223C	Inverting
LT1613	8200	82472C	Step-Up
LT1617	8200	82223C	Inverting
LT1619	3800	38L572C	Step-Up
LT1624	4800S	48100SC	Step-Down
LT1777	4600	46224C	Step-Down
LT1930	2700T	27T103C	Step-Up
MAX608	1800R	18R223C	Step-Up
MAX629	2400	24470C	Inverting
MAX649/51/52	2600	26S220C	Step-Down
MAX668/9	2300	23S4R7C	Step-Up
MAX742	1800R	18R104C	Step-Up
MAX749	2400	24S470C	Inverting
MAX756/7	2300	23220C	Step-Up
MAX764/5/6	2300	23S470C	Inverting
MAX774/5/6	2600	26S220C	Inverting
MAX796/7/8/9	4800S	484R7SC	Step-Down
MAX856/7/8/9	8400	84473C	Step-Up
MAX866/7	4800S	48331SC	Step-Up
MAX1626/7	4900	49220C	Step-Down
MAX1636	3900	39S103C	Step-Down
MAX1652/3/4/5	2800	28153C	Step-Down
MAX1672	8400	84103C	Step-Up/Down
MAX1705/6	2900	29103C	Step-Up
MAX1714	3500	35501C	Step-Down
MAX1715	3600	36332C	Step-Down
MAX1716/1854/5	3900	39S681C	Step-Down
MAX1771	2300	23S220C	Step-Up

INFINEON

Family	Murata Power Solutions		
	Series	Part number	IC type
IR38060	3800	38L801C	Step-Down
IR3823A	4800S	481R0SC	Step-Down
IR3883	4800S	481R0SC	Step-Down
IR3899A	3800	38L361C	Step-Down
IRPS5401	4800S	481R0SC	Step-Down
TDA38806/7	3600	36102C	Step-Down
TDA38812/3	3600	36401C	Step-Down
TLE8366	4900S	49470SC	Step-Down
TLE8386-2EL	4900S	49101SC	Step-Up
TLF50251EL	2400	24S100C	Step-Down
TLF50281EL	2400	24S100C	Step-Down
TLF51801EL	3900	39U562C	Step-Down
TLS4120D0EP	4800S	48220SC	Step-Down
TLS4125D0EP	4800S	48220SC	Step-Down

MICROCHIP

Family	Murata Power Solutions		
	Series	Part number	IC type
LM2574	4900S	49331SC	Step-Down
LM2575	1500	15334C	Step-Down
LM2576	6000B	60B104C	Step-Down
MCP16361/2/3	4600	46152C	Step-Down
MCP1665	4800S	484R7SC	Step-Up
MIC2171	2900	29153C	Step-Up
MIC2172/3172	2300	23S270C	Step-Up
MIC22601	3700	37301C	Step-Down
MIC22700	3600	36102C	Step-Down
MIC2290	2300	23100C	Step-Up
MIC23050	8400	84102C	Step-Down
MIC24066/7	4900S	493R3SC	Step-Down
MIC2570	2700T	27T473C	Step-Up
MIC2571	4800S	48151SC	Step-Up
MIC2601/2	3400	34103C	Step-Up
MIC26603ZA	4900S	492R2SC	Step-Down
MIC28517	1500	15682C	Step-Down

ON SEMICONDUCTOR

Family	Murata Power Solutions		
	Series	Part number	IC type
FAN2310/60	3800	38L801C	Step-Down
FAN2315/65	3600	36601C	Step-Down
FAN2356	4800	481R0SC	Step-Down
FAN23SV04	4500	45102C	Step-Down
FAN23SV06	4800	481R0SC	Step-Down
FAN23SV10	3800	38L801C	Step-Down
FAN23SV15	3600	36601C	Step-Down
FAN23SV20	3900	39H471C	Step-Down
FAN49100	8200	82102C	Step-Up/Down
FAN49103	2900	29102C	Step-Up/Down
FAN53540	4500	45541C	Step-Down
FAN53541	4500	45541C	Step-Down
FAN53602	8300	83421C	Step-Down
FAN8303	4600	46103C	Step-Down
LM2574	4900S	49331SC	Step-Down
LM2575	1500	15334C	Step-Down
LM2576	6000B	60B104C	Step-Down
LM2594	4900	49101SC	Step-Down
LM2595	4800S	48680SC	Step-Down
LM2596	1500	15333C	Step-Down
MC33163/34163	1200RS	12RS154C	Step-Up/Down
MC33166/34166	1400	1422435C	Step-Up/Down
MC33167/34167	1401	1422455C	Step-Up/Down
MC33470	2900	29152C	Step-Up
NCL30100	2400	24470C	Step-Down
NCP/NCV3064	4600	46473C	Step-Down
NCV2575	1500	15334C	Step-Down
NCV5171/3	4600	46223C	Step-Up
NCV8855	4900S	49100SC	Step-Up
NCV890231	2900	29472C	Step-Down
NCV890430	2700T	27T222C	Step-Down
NCV891334	2900	29222C	Step-Down

TEXAS INSTRUMENTS

Family	Murata Power Solutions		
	Series	Part number	IC type
LM1575/2575	1500	15334C	Step-Down
LM1577/2577	4800S	48101SC	Step-Up
LM2574	4900S	49331SC	Step-Down
LM2576	1400	1410454C	Step-Down
LM2594	4800S	48101SC	Step-Down
LM2595	4800S	48680SC	Step-Down
LM2596	1500	15333C	Step-Down
LM2597	4600	46104C	Step-Down
LM2598	4800S	48680SC	Step-Down
LM2599	1500	15333C	Step-Down
LM2651	4800S	48220SC	Step-Down
LM2653	4800S	48220SC	Step-Down
LM2670	1500	15333C	Step-Down
LM2671	4600	46104C	Step-Down
LM2672	4800S	48470SC	Step-Down
LM2673	1500	15333C	Step-Down
LM2674	4600	46104C	Step-Down
LM2675	4800S	48470SC	Step-Down
LM2676	1500	15333C	Step-Down
LM2677/8/9	1400	1422311C	Step-Down
LMR36506	4600	46223C	Step-Down
LMR51430	4800S	486R8SC	Step-Down
LMR54406/10	4600	46153C	Step-Down
LMR76003	1400	1410454C	Step-Down
TPR6100x	2700T	27T333C	Step-Up
TPS5102	4900S	496R8SC	Step-Down
TPS563202	4800S	481R0SC	Step-Down
TPS6734	4800S	48150SC	Step-Up
TPS6735	4500	45103C	Inverting
TPSM365R6	4800S	48101SC	Step-Down
UCC39411/2/3	2900	29223C	Step-Up

ROHM

Family	Murata Power Solutions		
	Series	Part number	IC type
BA9741/3/4	4800S	48330SC	Step-Down
BD8152/8FVM	4800S	48100SC	Step-Up
BD83070GWL	3400	34152C	Step-Up/Down
BD8P250MUF	4800S	48100SC	Step-Up/Down
BD906xx	4900S	49150SC	Step-Down
BD9300F	4500	45333C	Inverting
BD9A3xx	4600	46152C	Step-Down
BD9E1xx	4600	46682C	Step-Down
BD9E3xx	4900S	494R7SC	Step-Down
BD9G2xx	4900S	49220SC	Step-Down
BD9P1xx	2900	29222C	Step-Down
BD9P6xx	3900	39S152C	Step-Down
BD9S0xx	3400	34152C	Step-Down
BD9S4xx	3600	36102C	Step-Down
BD9V1xx	4500	45472C	Step-Down
BU33DV5G	2700T	27T223C	Step-Up
BU33DV7NUX	3400	34682C	Step-Up
BU34DV7NUX	3400	34682C	Step-Up
BU8311NUV	2400	24S4R7C	Step-Up

OTHER ICs

Family	Murata Power Solutions			
	Series	Part number	IC type	Company
A4550	6000A	60A103C	Step-Up/Down	Allegro Microsystems
S8355/56/57/58	2900	29223C	Step-Up	ABLIC
ZXSC410/20/40	2900	29223C	Step-Up	Diodes Inc
MP8670	4900S	494R7SC	Step-Down	Monolithic Power Systems Inc
NEX30606	8200	82222C	Step-Down	Nexperia

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