LR645

High-Input Voltage SMPS, Start-up/Linear Regulator

Features

- Accepts inputs from 15 to 450V
- Output currents: up to 3.0mA continuous, 30mA peak
- Supply current typically 50µA
- Line regulation typically 0.1mV/V
- Output can be trimmed from 8.0 to 12V
- Output current can be increased to 150mA with external FET

Applications

- Off-line SMPS startup circuits (pulse loads)
- Low power off-line regulators
- Regulators for noisy inputs

Description

LR645 is a high-input voltage, low-output current, linear regulator that is available in two versions. A 3-terminal, fixed-output voltage version is available in TO-92, TO-220 and SOT-89 packages, as well as an adjustable voltage version available in an 8-lead SOIC package.

The 3-terminal version of LR645 functions like any other low-voltage, 3-terminal regulator except it allows the use of much higher-input voltages. When used in a Switched-mode Power Supply (SMPS), start-up circuit, LR645 eliminates the need for large power resistors. In this application, current is drawn from the high voltage line only during start-up. Only leakage current flows after start-up, thereby reducing the continuous power dissipation to a few milliwatts.

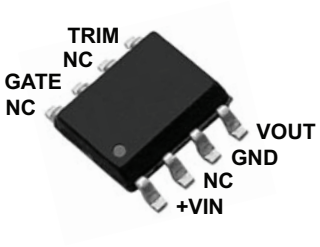
The adjustable-voltage version allows trimming of the output voltage from 8.0 to 12V. This version can also be connected to an external depletion mode metal–oxide–semiconductor field-effect transistor (MOSFET) for increased output current. When used in conjunction with depletion mode MOSFET DN2540N5, an output current of up to 150mA is achieved.

WARNING

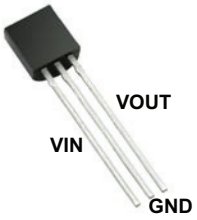
The LR645 does NOT provide galvanic isolation. When operated from an AC line, potentially lethal voltages can be present on the IC. Adequate means of protecting the end user from such voltages must be provided by the circuit developer.

© 2015 Microchip Technology Inc.

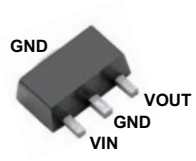
Package Type



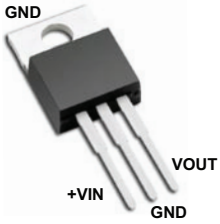
8-Lead SOIC



TO-92



TO-243AA (SOT-89)



TO-220

See Table 2-1 for pin information

© 2015 Microchip Technology Inc.

1.0 ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS

Input Voltage 450V
Output voltage 15.5V
Operating and storage temperature ..... -55°C to +150°C

Note: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions, above those indicated in the operational listings of this specification, is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

1.1 ELECTRICAL SPECIFICATIONS

TABLE 1-1: ELECTRICAL CHARACTERISTICS [1]

Symbol	Parameter	Min	Typ	Max	Units	Conditions
V_{OUT}	Output voltage	9.3	10	10.7	V	No load
	Output voltage over temperature[2]	9.0	10	11.5	V	T_J = - 40 to +125°C, No load
ΔV_{OUT}	Line regulation	-	40	200	mV	V_{IN} = 15 to 400V, No load
	Load regulation	-	150	400	mV	V_{IN} = 50V, I_{OUT} = 0 to 3.0mA
V_{IN}	Operating input voltage range	15	-	450	V	
I_{INQ}	Input quiescent current	-	50	150	µA	No Load
I_{OFF}	VIN off-state leakage current	-	0.1	10	µA	$V_{AUX} \geq V_{OUT}$ +1V applied to V_{OUT} pin
I_{AUX}	Input current to V_{OUT}	-	-	200	µA	$V_{AUX} \geq V_{OUT}$ +1V applied to V_{OUT} pin
$\Delta V_{OUT}/\Delta V_{IN}$	Ripple rejection ratio[2]	50	60	-	dB	120 Hz, No Load
e_n	Noise voltage[2]	-	25	-	µV	0.01 to 100 KHz
I_{PEAK}	Output peak current[3]	-	30	-	mA	C_{OUT} = 10 µF, V_{IN} = 400V
V_{AUX}	External voltage applied to V_{OUT}	-	-	13.2	V	
8-lead, adjustable voltage version only						
V_{OUT}	Output regulation trim range[2]	8	-	12	V	No load
ΔV_{OUT}	Load regulation at 8V trim[2]	-	200	400	mV	V_{IN} = 15V, I_{OUT} = 0 to 1.0 mA
	Load regulation at 12V trim[2]	-	100	400	mV	V_{IN} = 50V, I_{OUT} = 0 to 3.0 mA

1 Test Conditions unless otherwise specified: T_A = 25°C, V_{IN} = 15V-450V, C_{OUT} = 0.01 µF
2 Guaranteed by design
3 Pulse test duration <1.0 msec, duty cycle <2%

TABLE 1-2: THERMAL CHARACTERISTICS[1]

Package	θja	Power Dissipation @T_A=25°C
8-lead SOIC	101°C/W	0.31
TO-92	132°C/W	0.74
TO-220	29°C/W	1.8
TO-243AA (SOT-89)	133°C/W	1.6

1 Mounted on FR5 board; 25mm x 25mm x 1.57mm. Significant P_D increase possible on ceramic substrate.

© 2015 Microchip Technology Inc.

2.0 PIN DESCRIPTION

The locations of the pins are listed in Package Type.

TABLE 2-1: PIN DESCRIPTION

Function	Description
VIN	Regulator input. 8 - 450V.
GND	Ground return for all internal circuitry. This pin must be electrically connected to circuit common.
GATE	Output GATE driver for an external N-channel depletion.
TRIM	A voltage divider from V_{OUT} to this pin adjusts the output voltage.
VOUT	Regulator output.
NC	No connection.

© 2015 Microchip Technology Inc.

3.0 FUNCTIONAL DESCRIPTION

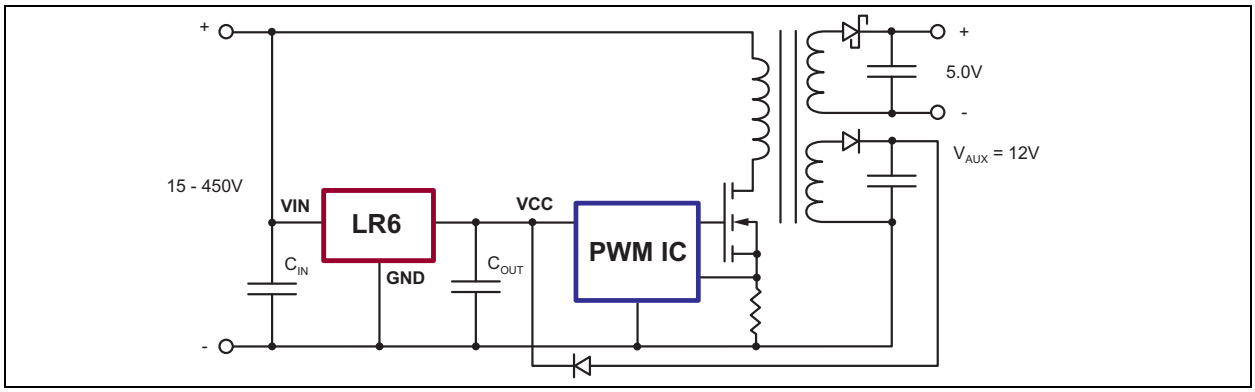
3.1 SMPS Start-Up Circuit

One of the main applications for LR645 is a start-up circuit for off-line, switch-mode power supplies (SMPS), as shown in Figure 3-1. A minimum output capacitance of 10 nF is recommended for stability. The wide operating, input voltage range of LR645 allows the SMPS to operate and start-up from rectified AC, or a DC voltage of 15 to 450V, without adjustment.

During start-up, the LR645 powers the V_{CC} line of the Pulse-Width Modulation (PWM) IC with a nominal output voltage of 10V. The auxiliary voltage connected through a diode to the V_{OUT} pin of LR645 will start to increase. When the auxiliary voltage becomes larger than the output voltage LR645 turns OFF both its internal high voltage input line and output voltage, allowing the auxiliary voltage to power the V_{CC} line of the PWM IC. After startup, LR645 doesn't draw any input current from the high-voltage line other than the leakage current of the internal MOSFET switch, which is typically 0.1µA.

The 3-terminal version shown in Figure 3-1 has load regulation guaranteed from 0 to 3.0mA at a fixed nominal output voltage of 10V. Applications requiring higher output current and/or a different output voltage can use the 8 pin adjustable version.

FIGURE 3-1: SMPS START-UP CIRCUIT

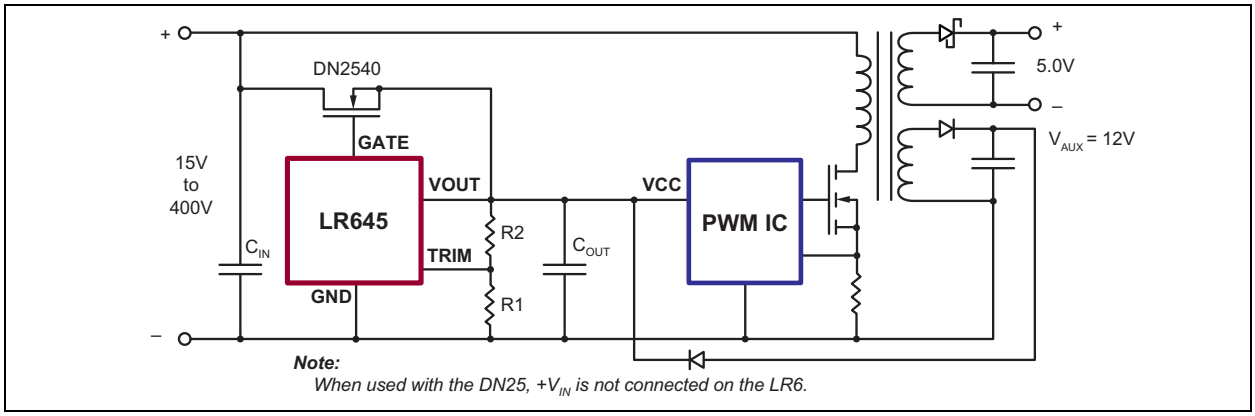


3.2 High-Current SMPS Start-Up Circuit

The 8-lead version of LR645 has connections for an external depletion-mode MOSFET for higher-output current and external resistors for adjustable-output voltage. As shown in Figure 3-2, the output current is increased to 150mA by using the DN2540, a 400V depletion-mode MOSFET. The maximum operating input voltage will be limited by the drain-to-source, breakdown voltage of the external MOSFET, but cannot exceed the 450V rating of LR645.

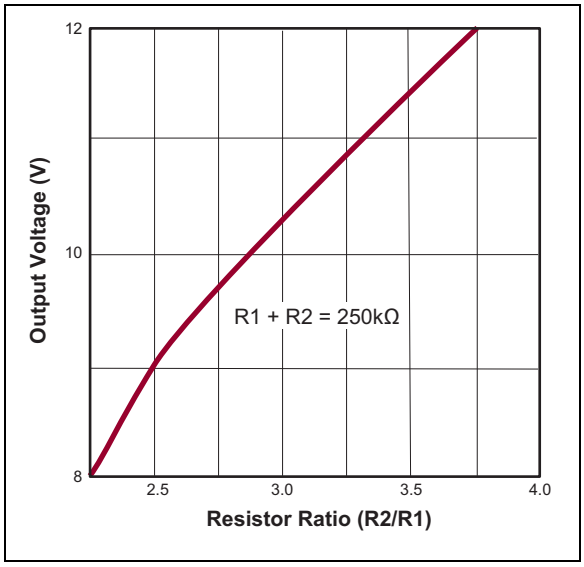
The output voltage can be adjusted from 8 to 12V with two external resistors: R1 and R2. The ratio of R2/R1 determines the output voltage. R2 is connected between the V_{OUT} and TRIM pins; R1 is connected between TRIM and GND pins. Figure 3-3 is a curve showing output voltage versus resistor ratio R2/R1. The optimum range for R1 + R2 is 200KΩ to 300KΩ. This minimizes loading and optimizes accuracy of the output voltage. Figure 3-3 uses an R1 + R2 of 250KΩ.

FIGURE 3-2: HIGH-CURRENT SMPS START-UP CIRCUIT



Note: *When used with the DN25, $+V_{IN}$ is not connected on the LR6.*

FIGURE 3-3: TYPICAL OUTPUT VOLTAGE VS RESISTOR RATIO



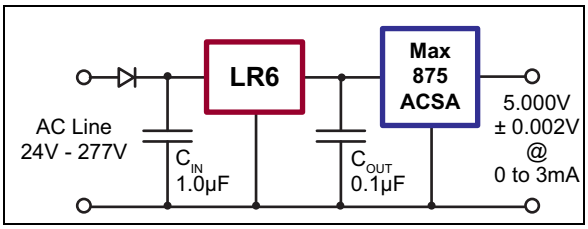
3.3 Off Line Linear Regulator

Circuits that require low voltages to operate logic and analog circuits benefit from LR645. The conventional use of step-down transformers can be eliminated, thereby saving space and cost. Some examples of low-voltage applications are: proximity controlled light switches, street lamp controls, and low-voltage power supplies for appliances such as washing machines, dishwashers, and refrigerators.

The wide operating-input voltage range of 15 to 450V, as well as the ripple rejection ratio of 50dB minimum, allows the use of a small, high-voltage input capacitor. The input AC line can be either full-wave or half-wave rectified. A minimum output capacitance of 0.01µF is recommended for output stability.

Figure 3-4 shows the LR645 as a pre-regulator to a precision regulator for high precision regulation. Higher output current is also possible by using an external depletion-mode MOSFET DN2540N5 as shown in Figure 3-5.

FIGURE 3-4: CASCADING FOR PRECISION



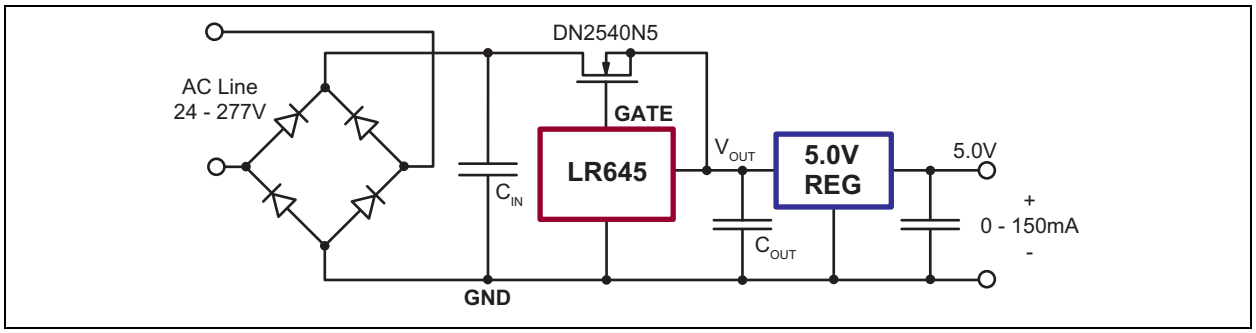
3.4 Power Dissipation Considerations

LR645 is a true linear regulator. Its power dissipation is therefore a function of input voltage and output load current. For example, if the LR645 provides a continuous load current of 3mA at 10V, while its input voltage is 400V, total dissipation in the LR645 will be:

$$P_{DISS} = (V_{IN} - V_{OUT}) \times (I_{OUT} + I_{MAXQuiescent})$$
$$= (400V - 10V) \times (3.0mA + 150\mu A)$$
$$= 1.23Watts$$

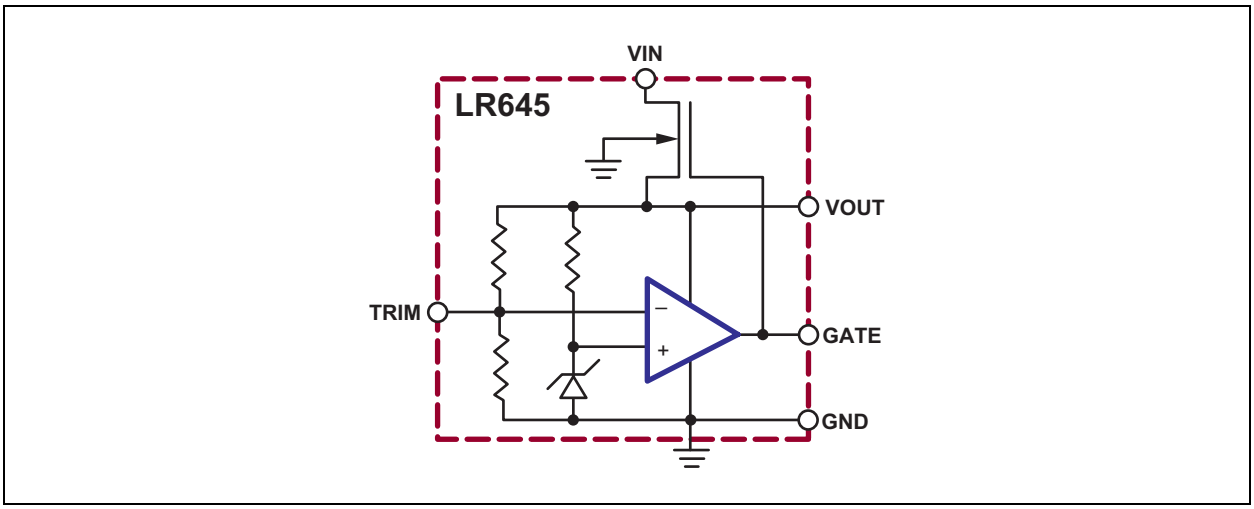
The 1.23 watts is for continuous operation. This is within the dissipation capabilities of the TO-220 and SOT-89 packages. See Table 1-2 on Page 3 for deratings. For SMPS start-up applications, the output current is usually required only during start-up. This duration depends upon the auxiliary supply output capacitor and C_{OUT}, but is typically a few hundred milliseconds. All package types of the LR645 have been characterized for use with a C_{OUT} of at least 10µF, and an AC line of 277V.

FIGURE 3-5: HIGH-CURRENT REGULATION



© 2015 Microchip Technology Inc.

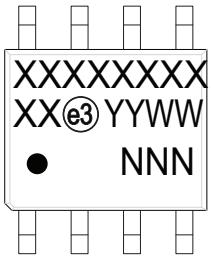
FIGURE 3-6: BLOCK DIAGRAM



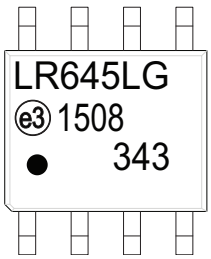
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

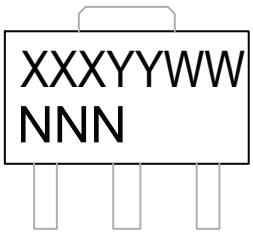
8-lead SOIC



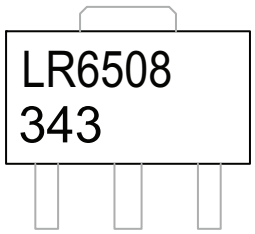
Example



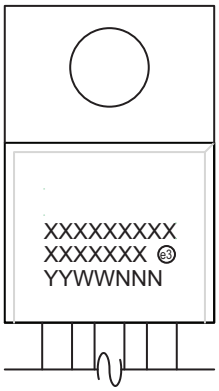
3-lead TO-243AA * (SOT-89)



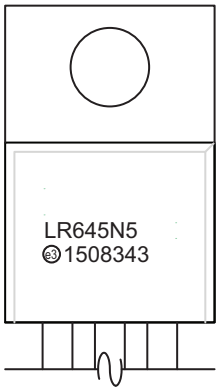
Example



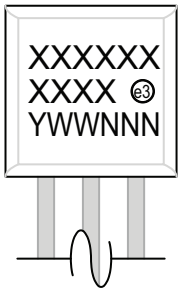
3-lead TO-220



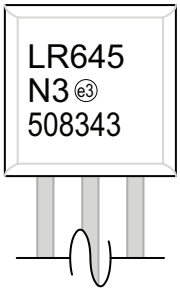
Example



3-lead TO-92



Example



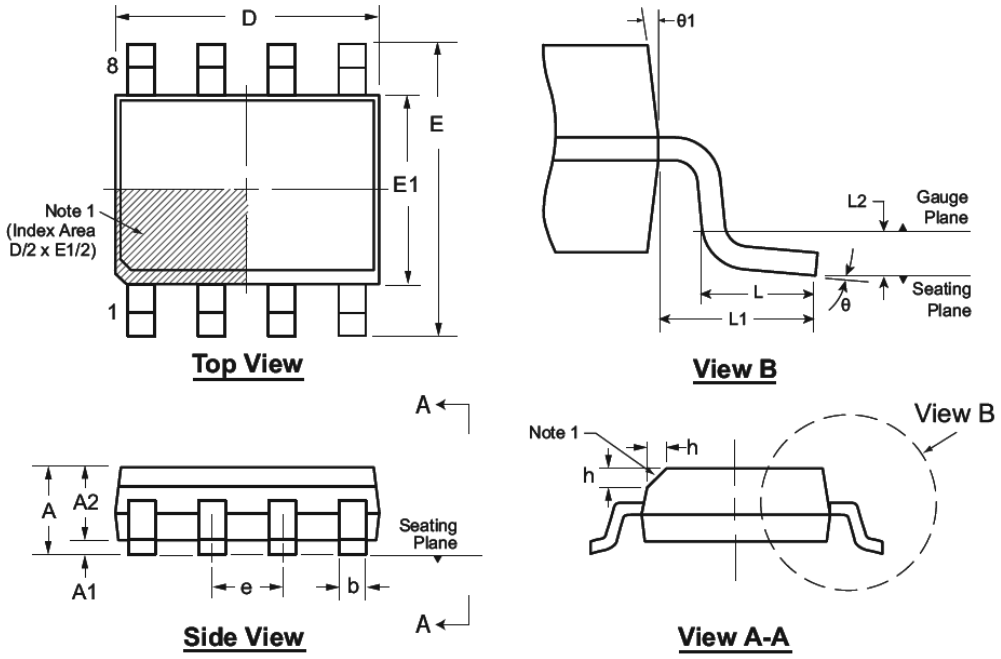
Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.

© 2015 Microchip Technology Inc.

8-Lead SOIC (Narrow Body) Package Outline (LG/TG)

4.90x3.90mm body, 1.75mm height (max), 1.27mm pitch



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Note:

1. *This chamfer feature is optional. A Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.*

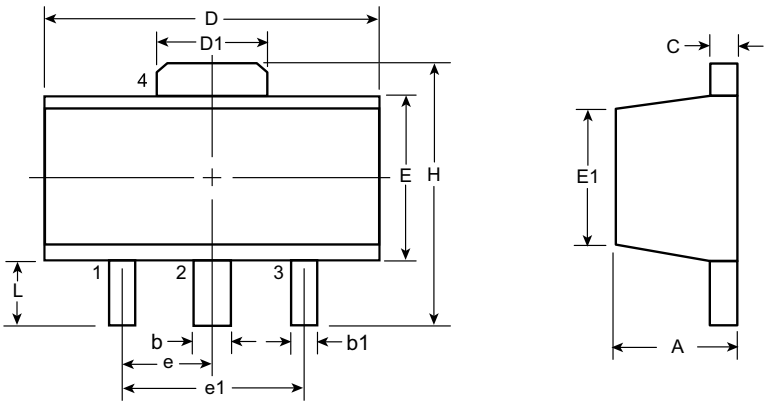
Symbol		A	A1	A2	b	D	E	E1	e	h	L	L1	L2	θ	θ1
Dimension (mm)	MIN	1.35*	0.10	1.25	0.31	4.80*	5.80*	3.80*	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°
	NOM	-	-	-	-	4.90	6.00	3.90		-	-			-	-
	MAX	1.75	0.25	1.65*	0.51	5.00*	6.20*	4.00*		0.50	1.27			8°	15°

JEDEC Registration MS-012, Variation AA, Issue E, Sept. 2005.

**** This dimension is not specified in the JEDEC drawing.***

Drawings are not to scale.

3-Lead TO-243AA (SOT-89) Package Outline (N8)



Top View **Side View**

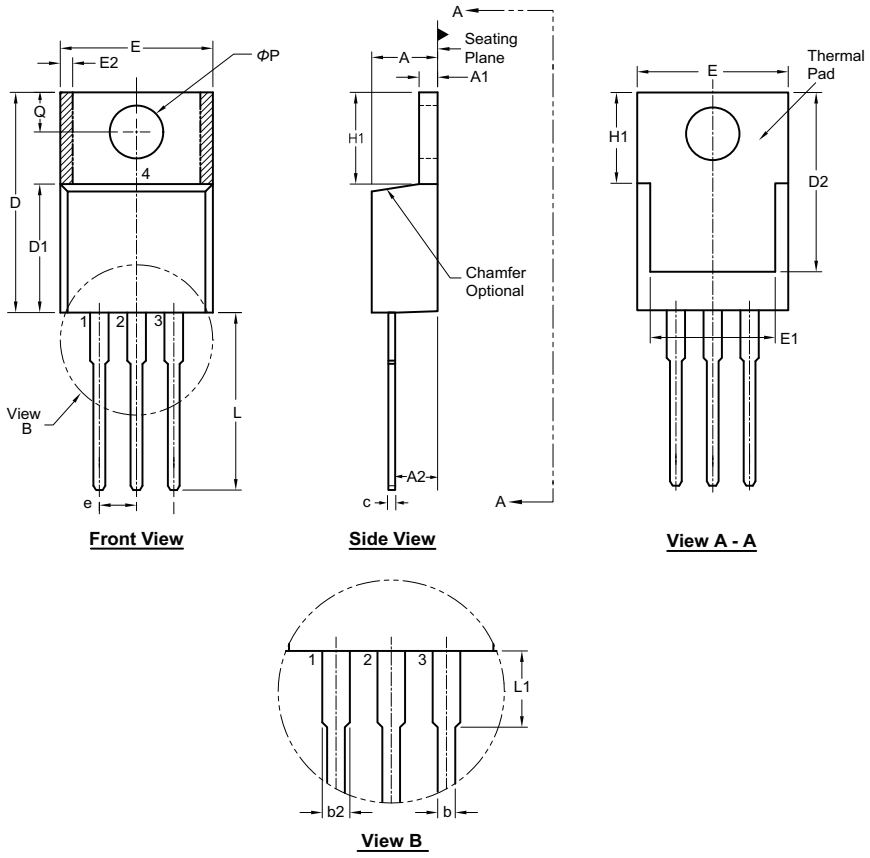
Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L
Dimensions (mm)	MIN	1.40	0.44	0.36	0.35	4.40	1.62	2.29	2.00†	1.50 BSC	3.00 BSC	3.94	0.73†
	NOM	-	-	-	-	-	-	-	-			-	-
	MAX	1.60	0.56	0.48	0.44	4.60	1.83	2.60	2.29			4.25	1.20

JEDEC Registration TO-243, Variation AA, Issue C, July 1986.
† This dimension differs from the JEDEC drawing
Drawings not to scale.

© 2015 Microchip Technology Inc.

3-Lead TO-220 Package Outline (N5)

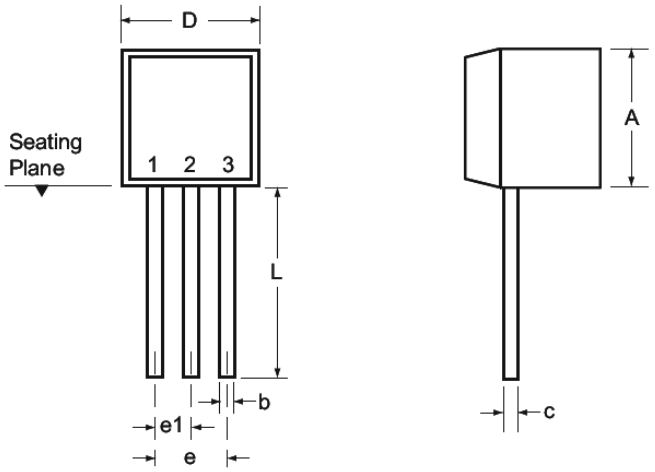


Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

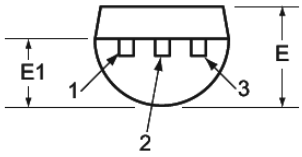
Symbol		A	A1	A2	b	b2	c	D	D1	D2	E	E1	E2	e	H1	L	L1	Q	ΦP
Dimension (inches)	MIN	.140	.020	.080	.015	.045	.012†	.560	.326†	.474†	.380	.270	0.20*	.100 BSC	.230	.500	.200*	.100	.139
	NOM	-	-	-	.027	.057	-	-	-	-	-	-	-		-	-	-	-	-
	MAX	.190	.055	.120†	.040	.070	.024	.650	.361†	.507	.420	.350	.030		.270	.580	.250	.135	.161

JEDEC Registration TO-220, Variation AB, Issue K, April 2002.
** This dimension is not specified in the JEDEC drawing.*
† This dimension differs from the JEDEC drawing.
Drawings not to scale.

3-Lead TO-92 Package Outline (L/LL/N3)



Front View **Side View**



Bottom View

Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol		A	b	c	D	E	E1	e	e1	L
Dimensions (inches)	MIN	.170	.014†	.014†	.175	.125	.080	.095	.045	.500
	NOM	-	-	-	-	-	-	-	-	-
	MAX	.210	.022†	.022†	.205	.165	.105	.105	.055	.610*

JEDEC Registration TO-92.
** This dimension is not specified in the JEDEC drawing.*
† This dimension differs from the JEDEC drawing.
Drawings not to scale.

© 2015 Microchip Technology Inc.

APPENDIX A: REVISION HISTORY

Revision A (April 2015)

- Update file to new format

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	XX	-	X	-	X
Device	Package Options		Environmental		Media Type

Device:	LR645	= High-Input, Voltage SMPS, Start-up/Linear Regulator
Package:	LG	= 8-lead SOIC (adjustable voltage)
	N3	= TO-92 (fixed voltage)
	N5	= TO-220(fixed voltage)
	N8	= TO-243AA (SOT-89) (fixed voltage)
Environmental	G	= Lead (Pb)-free/ROHS-compliant package
Media Type:	(blank)	= 3300/Reel for LG packages = 1000/Bag for N3 packages = 50/Tube for TO-220 packages = 2000/Reel for TO-243AA packages
	P003	= 2000/Reel for N3 package
	P013	= 2000/Ammo Pack for N3 package

Examples:

a)	LR645LG-G:	8-lead SOIC package, 3300/reel.
b)	LR645N3-G	TO-92 package, 1000/bag
c)	LR645N3-G-P003:	TO-92 package, 2000/reel.
d)	LR645N3-G-P013:	TO-92 package, 2000/ammo pack.
e)	LR645N5-G	TO-220 package, 50/tube
f)	LR645N8-G	TO-243AA package, 2000/reel

© 2015 Microchip Technology Inc.

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE**.** Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC^{32} logo, rfPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rfLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

Printed on recycled paper.

ISBN: 978-1-63277-244-2

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis

Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Dongguan
Tel: 86-769-8702-9880

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880- 3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

01/27/15

© 2015 Microchip Technology Inc.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.