



ON Semiconductor®

<http://onsemi.com>

LV5769V

Bi-CMOS IC

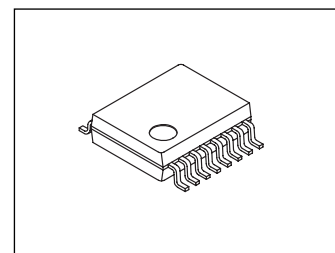
1-channel Step-down Switching Regulator

Overview

The LV5769V is a 1-channel step-down switching regulator.

Function

- 1 channel step-down switching regulator controller.
- Frequency decrease function at pendent.
- Load-independent soft start circuit.
- ON/OFF function.
- Built-in pulse-by-pulse OCP circuit. It is detected by using ON resistance of an external MOS.
- Synchronous rectification
- Current mode control



SSOP16(225mil)

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage	$V_{IN\ max}$		45	V
Allowable pin voltage	$V_{IN, SW}$		45	V
	HDRV, CBOOT		52	V
	LDRV		6.0	V
	Between CBOOT to SW		6.0	V
	Between CBOOT to HDRV		6.0	V
	EN, ILIM		$V_{IN}+0.3$	V
	Between V_{IN} to ILIM		1.0	V
	V_{DD}		6.0	V
SS, FB, COMP,RT			$V_{DD}+0.3$	V
Allowable Power dissipation	$P_d\ max$	Mounted on a specified board. *	0.74	W
Operating temperature	T_{opr}		-40 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

* Specified board : 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ORDERING INFORMATION

See detailed ordering and shipping information on page 9 of this data sheet.

LV5769V

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range	V _{IN}		8.5 to 42	V
Error amplifier input voltage	V _{FB}		0 to 1.6	V
Oscillatory frequency	F _{OSC}		80 to 500	kHz

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Electrical Characteristics at Ta = 25°C, V_{CC} = 12V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference voltage block						
Internal reference voltage	V _{ref}	Including offset of E/A	0.654	0.67	0.686	V
5V power supply	V _{DD}	I _{OUT} = 0 to 5mA	4.7	5.2	5.7	V
Triangular waveform oscillator block						
Oscillation frequency	F _{OSC}	RT=220kΩ	110	125	140	kHz
Frequency variation	F _{OSC} DV	V _{IN} = 8.5 to 32V		1		%
Oscillation frequency fold back detection voltage	V _{OSC} FB	FB voltage detection after SS ends		0.1		V
Oscillation frequency after fold back	F _{OSC} FB			1/3F _{OSC}		kHz
ON/OFF circuit block						
IC start-up voltage	V _{EN} on		2.5	3.0	3.5	V
IC off voltage	V _{EN} off		1.1	1.3	1.5	V
Soft start circuit block						
Soft start source current	I _{SS} SC	EN > 3.5V	4	5	6	μA
Soft start sink current	I _{SS} SK	EN < 1V, V _{DD} = 5V		2		mA
UVLO circuit block						
UVLO lock release voltage	V _{UVLO}			8		V
UVLO hysteresis	V _{UVLO} H			0.7		V
Error amplifier						
Input bias current	I _{EA} IN				100	nA
Error amplifier gain	G _{EA}		1000	1400	1800	μA/V
Sink output current	I _{EA} OSK	FB = 1.0V		-100		μA
Source output current	I _{EA} OSC	FB = 0V		100		μA
Current detection amplifier gain	G _{ISNS}			1.5		
over current limiter circuit block						
Reference current	I _{LIM}		-10%	18.5	+10%	μA
Over current detection comparator offset voltage	V _{LIM} OFS		-5		+5	mV
Over current detection comparator common mode input range			V _{IN} -0.45		V _{IN}	V
PWM comparator						
Input threshold voltage (F _{OSC} =125kHz)	V _t max	Duty cycle = DMAX	0.9	1.0	1.1	V
	V _{t0}	Duty cycle = 0%	0.4	0.5	0.6	V
Maximum ON duty	DMAX		86	90	95	%
Output block						
Output stage ON resistance (the upper side)	R _{ONH}			5		Ω
Output stage ON resistance (the under side)	R _{ONL}			5		Ω
Output stage ON current (the upper side)	I _{ONH}		240			mA
Output stage ON current (the under side)	I _{ONL}		240			mA

Continued on next page.

LV5769V

Continued from preceding page.

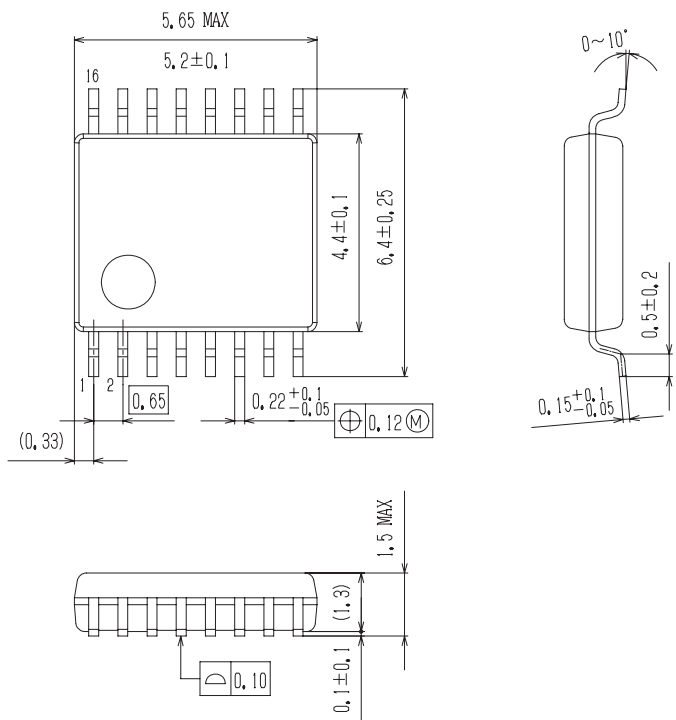
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
The whole device						
Standby current	I _{CCS}	EN < 1V			10	μA
Mean consumption current	I _{CCA}	EN > 3.5V		3		mA
Security function						
Protection function operating temperature at high temperature	TSD on	* Design certification		170		°C
Protection function hysteresis at high temperature	TSD hys	* Design certification		30		°C

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

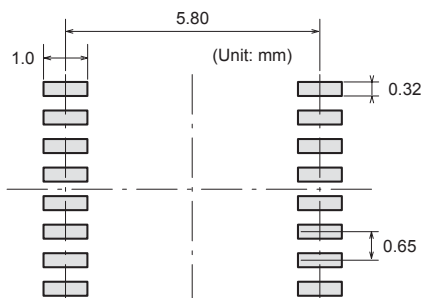
Package Dimensions

unit : mm

SSOP16 (225mil)
CASE 565AM
ISSUE A



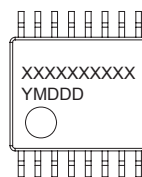
SOLDERING FOOTPRINT*



NOTE: The measurements are not to guarantee but for reference only.

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

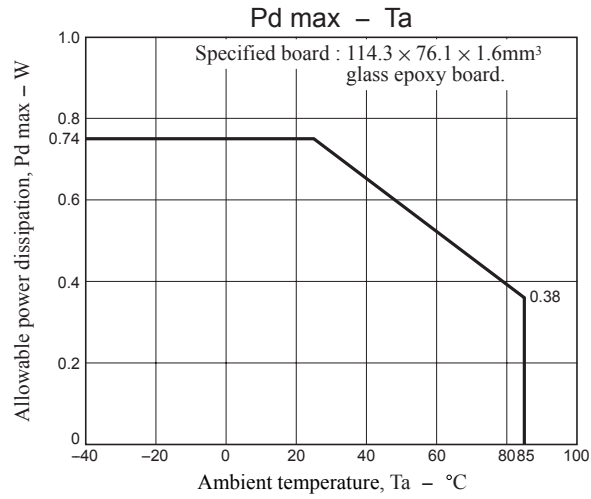
GENERIC MARKING DIAGRAM*



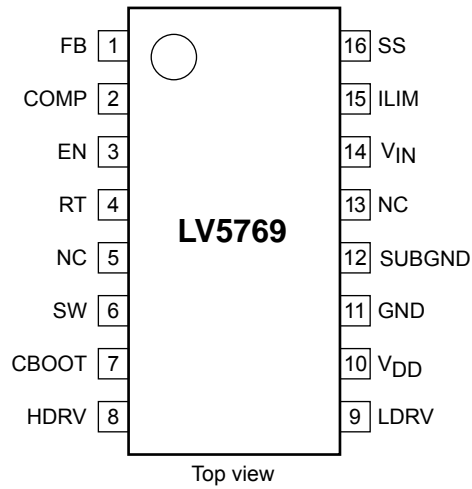
XXXXX = Specific Device Code
Y = Year
M = Month
DDD = Additional Traceability Data

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

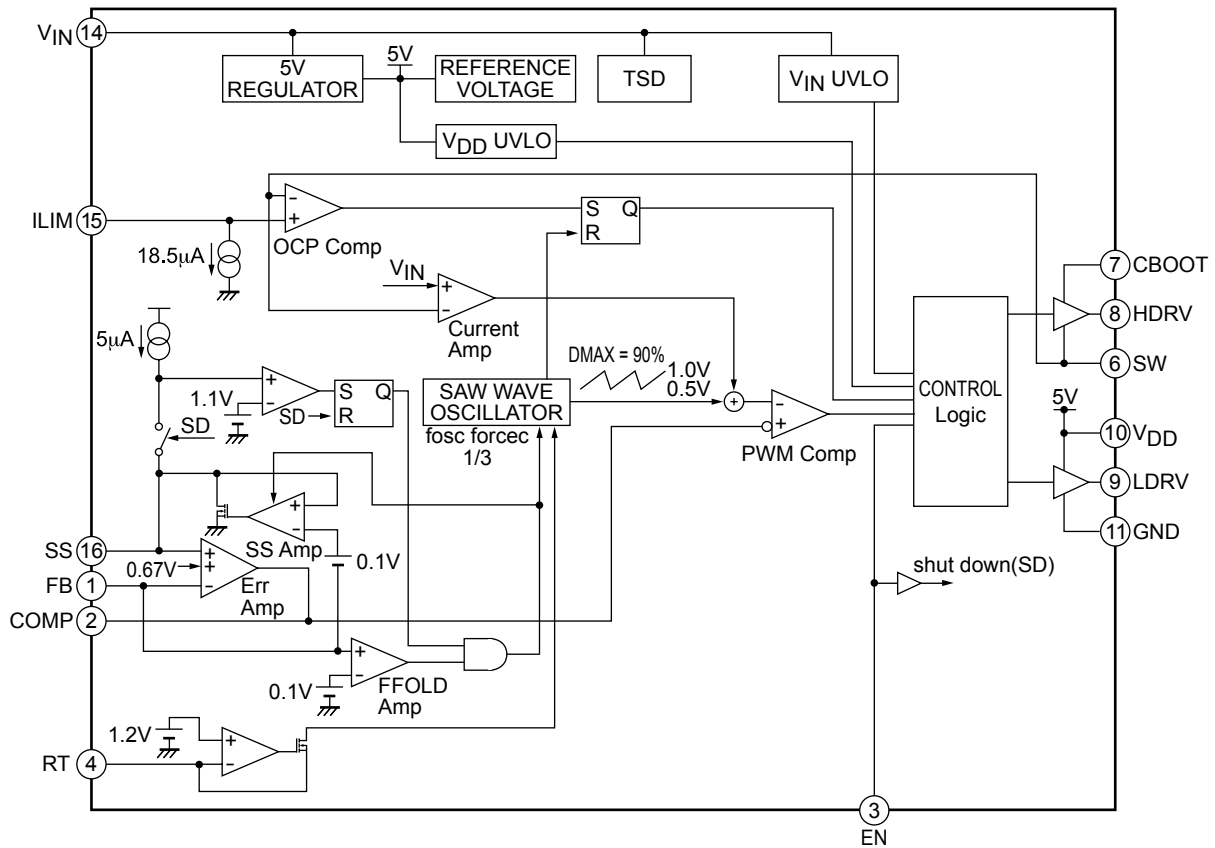
LV5769V



Pin Assignment



Block Diagram



Pin Function

Pin No.	Pin name	Description
1	FB	Error amplifier reverse input pin. By operating the converter, the voltage of this pin becomes 0.67V. The voltage in which the output voltage is divided by an external resistance is applied to this pin. Moreover, when this pin voltage becomes 0.1V or less after a soft start ends, the oscillatory frequency becomes 1/3.
2	COMP	Error amplifier output pin. Connect a phase compensation circuit between this pin and GND.
3	EN	ON/OFF pin.
4	RT	Oscillation frequency setting pin. Resistance is connected with this pin between GND.
5,13	N.C.	No connection *2
6	SW	Pin to connect with switching node. Upper part NchMOSFET external a source is connected with lower side NchMOSFET external a drain.
7	CBOOT	Bootstrap capacity connection pin. This pin becomes a GATE drive power supply of an external NchMOSFET. Connect a bypath capacitor between CBOOT and SW.
8	HDRVV	An external the upper MOSFET gate drive pin.
9	LDRVV	An external the lower MOSFET gate drive pin.
10	VDD	Power supply pin for an external the lower MOS-FET gate drive.
11	GND	Ground pin. Each reference voltage is based on the voltage of the ground pin.
12	SUBGND	It is connected with the GND pin of 11pin internally. *3
14	VIN	Power supply pin. This pin is monitored by UVLO function. When the voltage of this pin becomes 8V or more by UVLO function, The IC starts and the soft start function operates.
15	ILIM	Reference current pin for current detection. The sink current of about 18.5µA flows to this pin. When a resistance is connected between this pin and VIN outside and the voltage applied to the SW pin is lower than the voltage of the terminal side of the resistance, the upper NchMOSFET is off by operating the current limiter comparator. This operation is reset with respect to each PWM pulse.
16	SS	Pin to connect a capacitor for soft start. A capacitor for soft start is charged by using the voltage of about 5µA. This pin ends the soft start period by using the voltage of about 1.1V and the frequency fold back function becomes active.

*2: There is no problem even if it connects it with GND.

*3: Short-circuited and use 11pin and 12pin as GND.

LV5769V

I/O pin equivalent circuit chart

Pin No.	Equivalent Circuit
FB, SS V _{DD} (10) FB (1) SS (16) GND (11)	<p>Standard voltage 0.67V</p> <p>1.3V</p> <p>0.1V</p> <p>1.1V</p>
COMP V _{DD} (10) COMP (2) GND (11)	<p>1.6V</p>
EN V _{IN} (14) EN (3) GND (11)	
RT V _{DD} (10) RT (4) GND (11)	

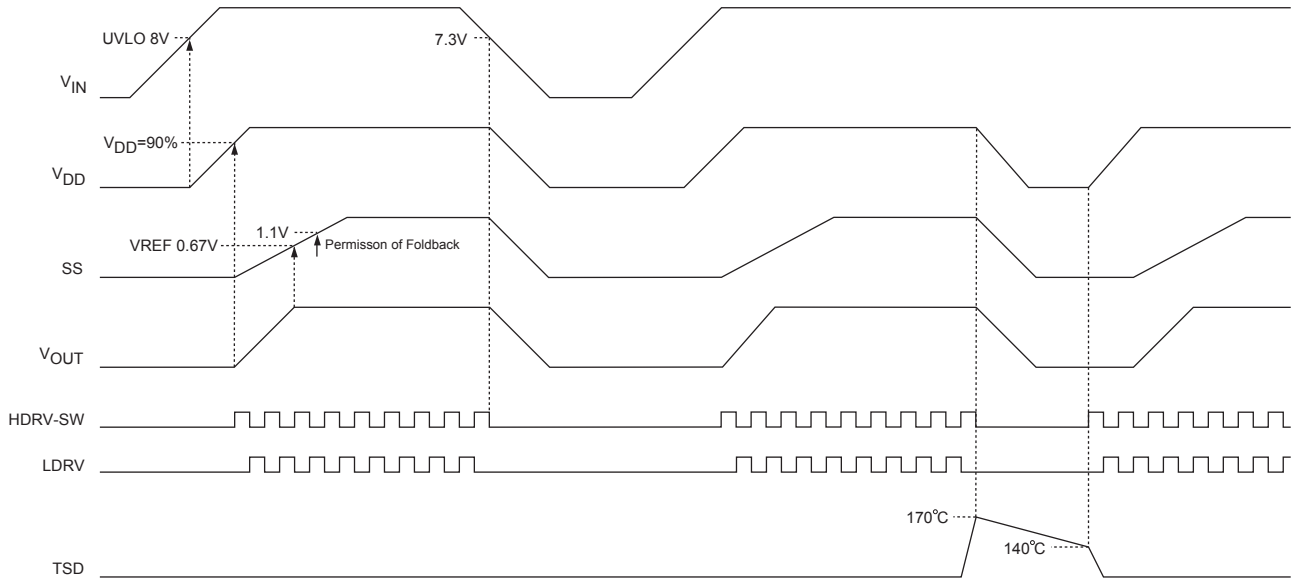
Continued on next page.

LV5769V

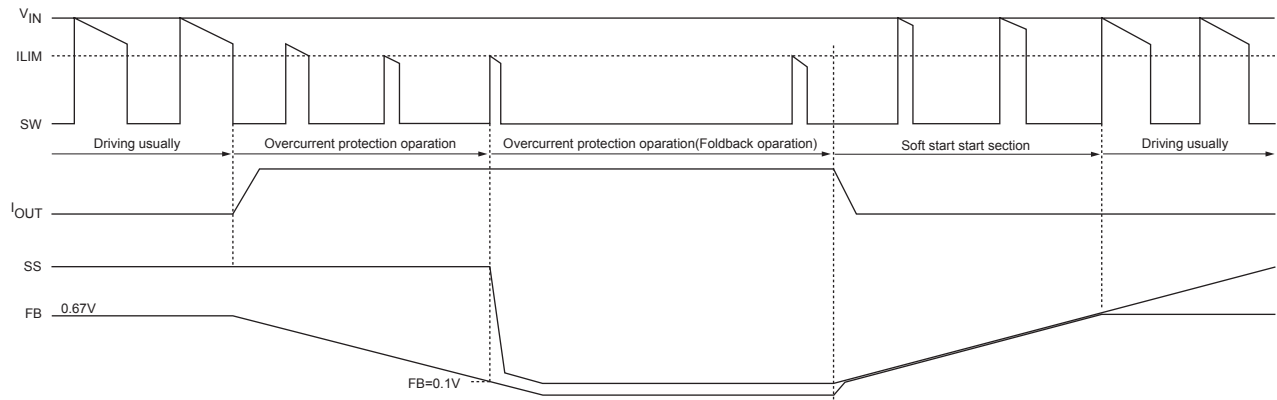
Continued from preceding page.

Pin No.	Equivalent Circuit
SW, CBOOT, HDRV	
LDRV	
VDD	
ILIM	

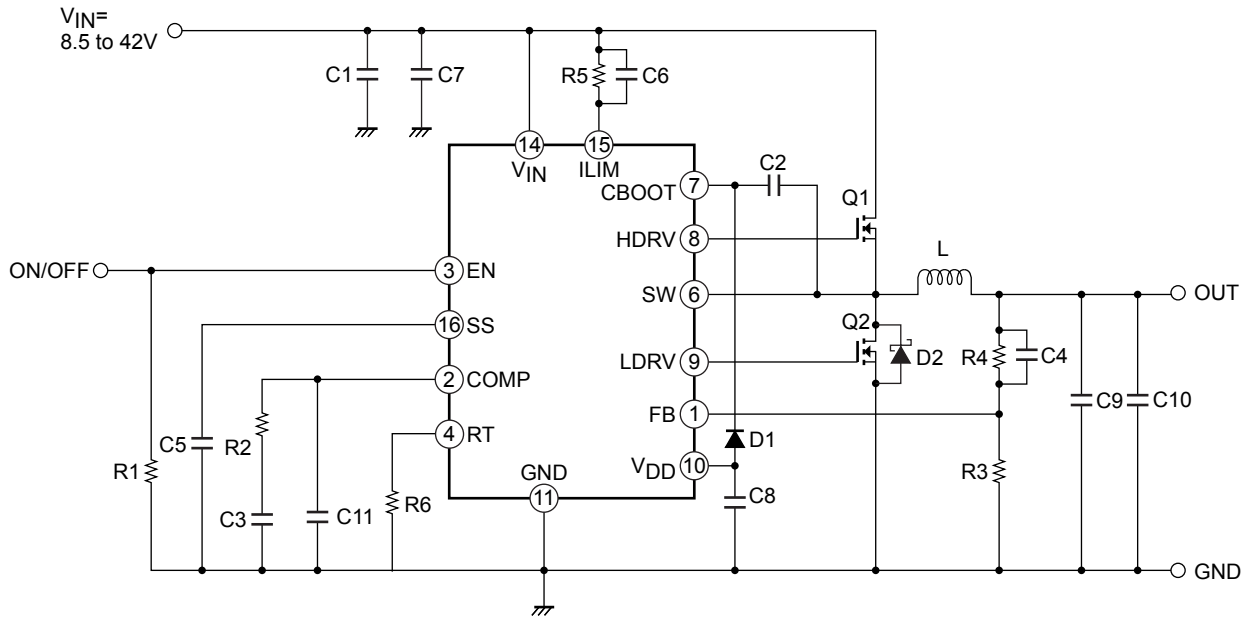
Boot sequence, UVLO, and TSD operation



Sequence of overcurrent protection



Sample Application Circuit



ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
LV5769V-MPB-E	SSOP16 (225mil) (Pb-Free / Halogen Free)	90 / Fan-Fold
LV5769VZ-MPB-E	SSOP16 (225mil) (Pb-Free / Halogen Free)	90 / Fan-Fold
LV5769VZ-TLM-E	SSOP16 (225mil) (Pb-Free / Halogen Free)	2000 / Tape & Reel

ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.