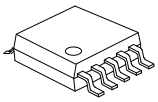
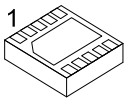
UR5513

LINEAR INTEGRATED CIRCUIT

2A DDR BUS TERMINATION REGULATOR



MSOP-10



DFN3030-10

■ DESCRIPTION

The **UR5513** is a sink/source tracking termination regulator. The UR5513 possesses ahigh speed operating amplifier that provides fast load transient response and only requires a minimum 30uF ceramic output capacitor. The **UR5513** supports remote sensing functions and all features required to power the DDRIII and Low Power DDRIII/DDRIV VTT bus termination. In addition , the UR5513 Provides an open-drain PGOOD signal to monitor the output regulation and an EN signal that can be used to discharge VTT during S3(suspent to RAM) for DDR applications.

■ FEATURES

* V_{CNTL} Voltage Range: 2.9~5.5V
* V_{IN} Voltage Range: 1.1V~3.5V
* Support Ceramic Capacitors
* Power Good Indicator
* DDRIII,Low Power DDRIII/DDRIV VTT Applications
* 2A Source/Sink VTT output
* 10mA Source/Sink Reference output
* Soft-start Function
* UVLO and OCP Protection
* Thermal Shutdown Protection

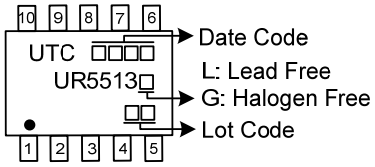
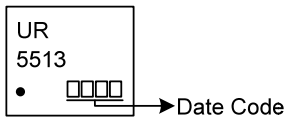
■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
UR5513L-SM2-R	UR5513G-SM2-R	MSOP-10	Tape Reel
UR5513L-K10-3030-R	UR5513G-K10-3030-R	DFN3030-10	Tape Reel

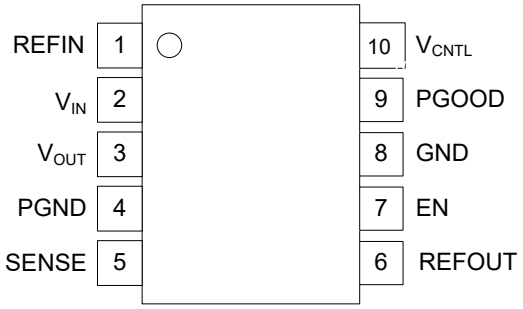
UR5513G-SM2-R
(1)Packing Type
(2)Package Type
(3)Green Package

(1) R: Tape Reel
(2) SM2: MSOP-10, K10-3030: DFN3030-10
(3) G: Halogen Free and Lead Free, L: Lead Free

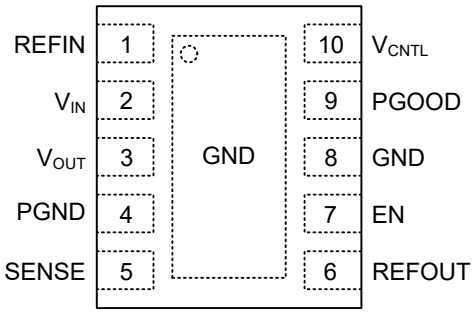
■ MARKING

MSOP-10	DFN3030-10
	

■ PIN CONFIGURATIONS



MSOP-10

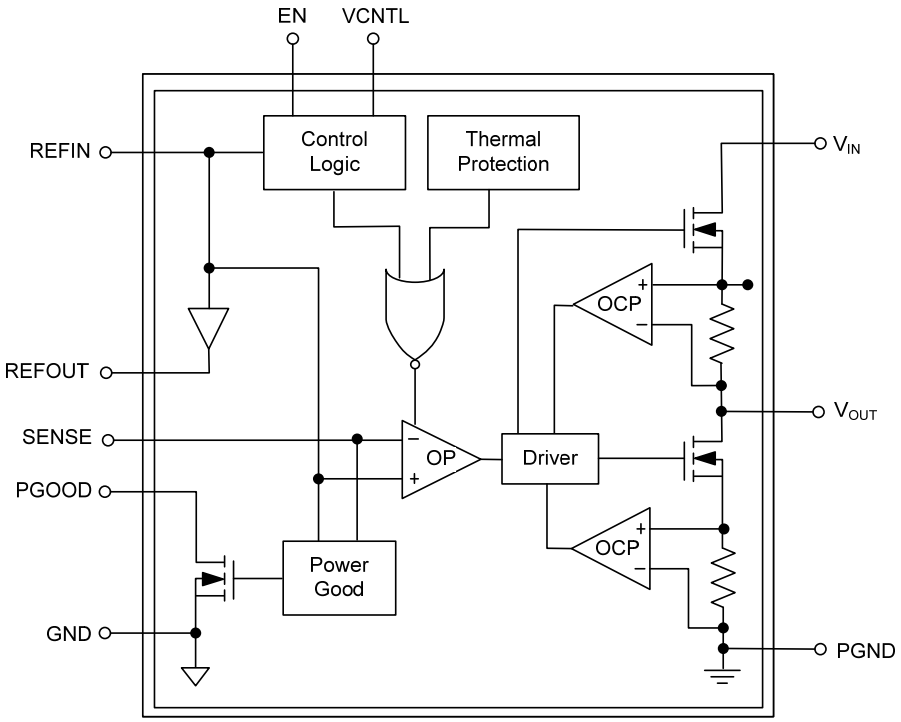


DFN3030-10
(Top View)

■ PIN DESCRIPTION

PIN No.	PIN NAME	PIN DESCRIPTION
1	REFIN	Reference input
2	V_{IN}	Power Input of VTT Regulator
3	V_{OUT}	Power Output of VTT Regulator
4	PGND	Power Ground of VTT Regulator
5	SENSE	Voltage Sense input of VTT Regulator
6	REFOUT	Reference output
7	EN	Enable control input of VTT Regulator
8	GND	Analog Ground.
9	PGOOD	Power Good open-drain output
10	V_{CNTL}	Control Voltage input
Exposed Pad	GND	Connect exposed pad to GND.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage (V_{IN}, V_{CNTL})		-0.3 ~ 6	V
Input Voltage (EN,REFIN,SENSE)		-0.3 ~ 6	V
OUTPUT Voltage (REFOUT, V_{OUT}, PGOOD)		-0.3 ~ 6	V
Junction Temperature	T_J	+150	°C
Storage Temperature	T_{STG}	-55 ~ +160	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ RECOMMENDED OPERATING CONDITIONS (Note1, 2)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Control input Volatge	V_{CNTL}	2.9		5.5	V
Supply input Voltage	V_{IN}	1.1		3.5	V
Operating Temperature	T_A	-40		+85	°C

Notes: 1. All voltage values are with respect to the network ground terminal unless otherwise specified.
2. Please always keep V_{LDOIN}, V_{TTSNS},V_{DDQSNS}, S3, S5 lower than V_{IN} on operation.

■ ELECTRICAL CHARACTERISTICS

(V_{EN}= V_{CNTL}=5V, V_{IN}=1.5V, V_{REFIN}=0.75V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY CURRENT						
V_{CNTL} Supply Current	I_{CNTL}	V_{EN}= V_{CNTL}=5V, No load		0.7	1	mA
V_{CNTL} Shutdown Current	I_{SHDN}	V_{EN}= V_{REFIN}=0, No load		50	80	uA
	I_{STDBY}	V_{EN}=0, V_{REFIN}>0.45V, No load		200	400	uA
V_{IN} Supply Current	I_{VIN}	V_{EN}= V_{CNTL}=5V, No load		1	50	uA
V_{IN} Shutdown Current	$I_{VINSHDN}$	V_{EN}= 0, No load		0.1	50	uA
OUTPUT						
V_{TT} Output Voltage	V_{OUT}	V_{IN}=1.5V, V_{REFIN}=0.75V, I_{OUT}=0		0.75		V
		V_{IN}=1.35V, V_{REFIN}=0.675V, I_{OUT}=0		0.675		V
		V_{IN}=1.2V, V_{REFIN}=0.6V, I_{OUT}=0		0.6		V
VTT Output Voltage Offset Respect to REFIN	V_{OUT-OS}	V_{IN}=1.5V, V_{REFIN}=0.75V, $\|I_{OUT}\|$=2A	-25		25	mV
		V_{IN}=1.35V, V_{REFIN}=0.675V, $\|I_{OUT}\|$=2A	-25		25	
		V_{IN}=1.2V, V_{REFIN}=0.6V, $\|I_{OUT}\|$=2A	-25		25	
VOUT Source Current Limit	$I_{LIM-OUT-SR}$	VOUT in PGOOD Window	2.1	3		A
VOUT Sink Current Limit of	$I_{LIM-OUT-SK}$	VOUT in PGOOD Window	2.1	3		A
VOUT Discharge Resistance	R_{DIS}	V_{EN}=0, V_{OUT}=0.3V			25	OHM
PGOOD COMPARATOR						
PGOOD Threshold	$V_{TH-PGOOD}$	V_{SENSE} Lower Threshold	-25	-20	-15	%
		V_{SENSE} Upper Threshold	15	20	25	
		PGOOD Hysteresis		5		
PGOOD Start-up Delay	$T_{PGDelay-H}$	V_{SENSE} with-in PGOOD range		2		mS
PGOOD falling Delay	$T_{PGDelay-L}$	V_{SENSE} is out of PGOOD range		10		uS
Output Low Voltage	V_{OL-PG}	I_{PGOOD}=4mA			0.4	V
PGOOD Leakage Current	$I_{LEAK-PG}$	V_{EN}= V_{CNTL}+ 0.3V		0.1	3	uA

■ ELECTRICAL CHARACTERISTICS (Cont.)

(V_{EN}= V_{CNTL}=5V, V_{IN}=1.5V, V_{REFIN}=0.75V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
REFIN AND REFOUT						
REFIN Voltage range	V_{REFIN}		0.5		1.8	V
REFIN input Current	I_{REFIN}	V_{EN}=V_{CNTL}			1	uA
REFIN Under-Voltage Lockout	$V_{UVLO-REF}$	REFIN Rising		390	420	mV
		Hysteresis		20		
REFOUT Voltage tolerance	$V_{TOL-REF}$	REFIN=0.75V, $\|I_{REFOUT}\|$=0~10mA	-15		15	mV
		REFIN=0.675V, $\|I_{REFOUT}\|$=0~10mA	-15		15	
		REFIN=0.6V, $\|I_{REFOUT}\|$=0~10mA	-15		15	
REFOUT Source Current limit	$I_{LIM-REFO-SR}$	V_{REFOUT}=0	10	50		mA
REFOUT Sink Current limit	$I_{LIM-REFO-SK}$	V_{REFOUT}=REFIN+1V	10	50		
UVLO/EN						
V_{CNTL} UVLO Threshold	$V_{UVLO-CNTL}$	Rising		2.6	2.9	V
		Hysteresis		120		mV
EN Input Logic High	VI_{H-EN}		1.7			V
EN Input Logic Low	V_{IL-EN}				0.3	
Thermal SHUTDOWN						
Thermal Shutdown Threshold	T_{SD}	Shutdown Temperature		160		°C
		Hysteresis		20		

■ TYPICAL APPLICATIONS CIRCUIT