

Low Power Economy BiCMOS Current Mode PWM

FEATURES

- 100µA Typical Starting Supply Current
- 500µA Typical Operating Supply Current
- Operation to 1MHz
- Internal Soft Start
- Internal Fault Soft Start
- Internal Leading-Edge Blanking of the Current Sense Signal
- 1 Amp Totem-Pole Output
- 70ns Typical Response from Current-Sense to Gate Drive Output
- 1.5% Tolerance Voltage Reference
- Same Pinout as UCC3802, UC3842, and UC3842A

DESCRIPTION

The UCC3813-0/-1/-2/-3/-4/-5 family of high-speed, low-power integrated circuits contain all of the control and drive components required for off-line and DC-to-DC fixed frequency current-mode switching power supplies with minimal parts count.

These devices have the same pin configuration as the UC3842/3/4/5 family, and also offer the added features of internal full-cycle soft start and internal leading-edge blanking of the current-sense input.

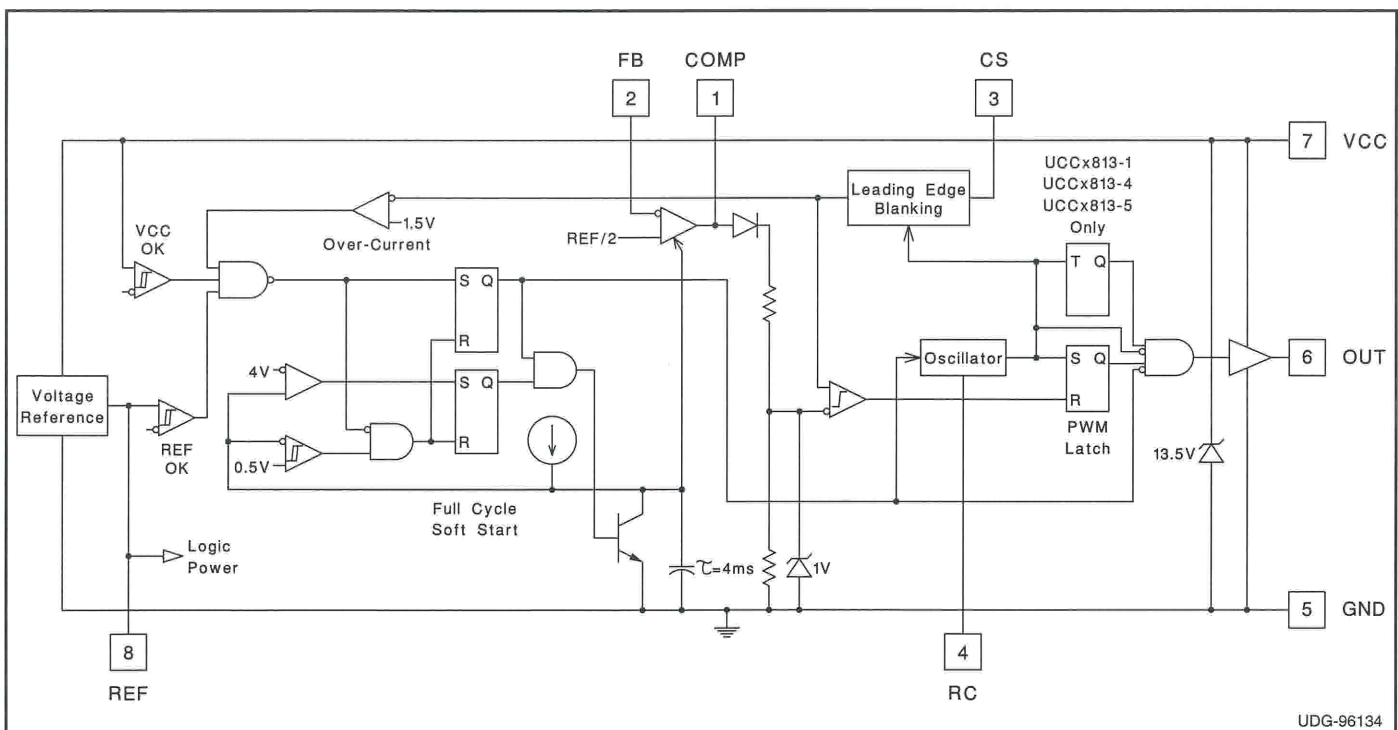
The UCC3813-0/-1/-2/-3/-4/-5 family offers a variety of package options, temperature range options, choice of maximum duty cycle, and choice of critical voltage levels. Lower reference parts such as the UCC3813-3 and UCC3813-5 fit best into battery operated systems, while the higher reference and the higher UVLO hysteresis of the UCC3813-2 and UCC3813-4 make these ideal choices for use in off-line power supplies.

The UCC2813-x series is specified for operation from -40°C to +85°C and the UCC3813-x series is specified for operation from 0°C to +70°C.

ORDERING INFORMATION

Part Number	Maximum Duty Cycle	Reference Voltage	Turn-On Threshold	Turn-Off Threshold
UCCx813-0	100%	5V	7.2V	6.9V
UCCx813-1	50%	5V	9.4V	7.4V
UCCx813-2	100%	5V	12.5V	8.3V
UCCx813-3	100%	4V	4.1V	3.6V
UCCx813-4	50%	5V	12.5V	8.3V
UCCx813-5	50%	4V	4.1V	3.6V

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Note 1)

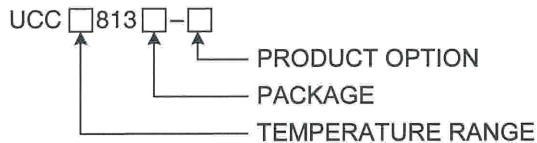
VCC Voltage (Note 2)	12.0V
VCC Current	30.0mA
OUT Current	±1.0A
OUT Energy (Capacitive Load)	20.0μJ
Analog Inputs (FB, CS, RC, COMP)	
.....	-0.3V to the lesser of 6.3V or VCC + 0.3V
Power Dissipation at T _A < +25°C (N Package)	1.0W
Power Dissipation at T _A < +25°C (D Package)	0.65W
Storage Temperature	-65°C to +150°C
Junction Temperature	-55°C to +150°C

Note 1: All voltages are with respect to GND. All currents are positive into the specified terminal. Consult Unitrode Integrated Circuits databook for information regarding thermal specifications and limitations of packages.

Note 2: In normal operation VCC is powered through a current limiting resistor. Absolute maximum of 12V applies when VCC is driven from a low impedance source such that I_{CC} does not exceed 30mA. The resistor should be sized so that the VCC voltage under operating conditions is below 12V but above the turn off threshold.

	TEMPERATURE RANGE	PACKAGES
UCC2813	-40°C TO +85°C	N, D, PW
UCC3813	0°C TO +70°C	N, D, PW

ORDERING INFORMATION



PACKAGE	θ _{JA}	θ _{JC}	COMMENTS
DIL-8N	110	50	
TSSOP-8PW	232-257	32	Modeled using 0.3 mm trace widths
SOIC-8D	40-70	22	

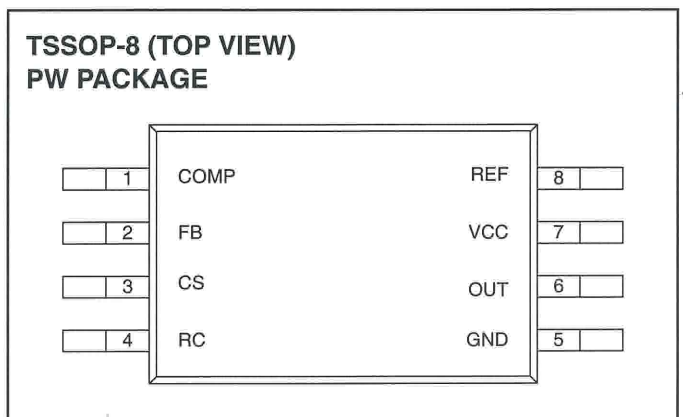
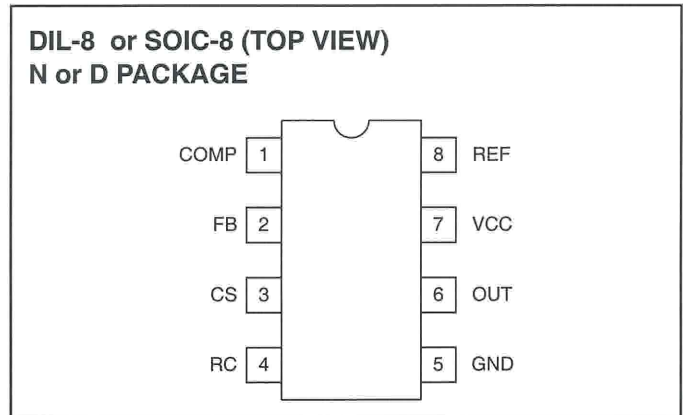
(1) Specified θ_{JA} (junction to ambient) is for devices mounted to 5-in² FR4 PC board with one ounce copper where noted. When resistance range is given, lower values are for 5-in² aluminum PC board. Test PWB was 0.062 in thick and typically used 0.635-mm trace widths for power packages and 1.3-mm trace widths for non-power packages with a 100 x 100-mil probe land area at the end of each trace.

(2) θ_{JC} data values stated were derived from MIL-STD-1835B. MIL-STD-1835B states: The baseline values shown are worst case (mean + 2s) for a 60 x 60 mil microcircuit device silicon die and applicable for devices with die sizes up to 14400 square mils. For device die sizes greater than 14400 square mils use the following values; dual-in-line, 11°C/W; flat pack, 10°C/W; pin grid array, 10°C/W".

(3) Modeled data. If value range given for θ_{JA}, lower value is for 3 x 3 inch. One ounce internal copper ground plane, higher value is for 1 x 1 inch ground plane. All model data assumes only one trace for each non-fused lead.

(4) Specified thermal resistance is θ_{JL} (junction to lead) where noted.

CONNECTION DIAGRAMS



ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for UCC2813-x; $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for UCC3813-x; $V_{CC} = 10\text{V}$ (Note 3); $R_T = 100\text{k}$ from REF to RC; $C_T = 330\text{pF}$ from RC to GND; $0.1\mu\text{F}$ capacitor from VCC to GND; $0.1\mu\text{F}$ capacitor from VREF to GND. $T_A = T_J$.

PARAMETER	TEST CONDITIONS	UCC2813-x UCC3813-x			UNITS
		MIN	TYP	MAX	
Reference Section					
Output Voltage	$T_J = +25^{\circ}\text{C}$, $I = 0.2\text{mA}$, UCCx813-0/-1/-2/-4	4.925	5.00	5.075	V
	$T_J = +25^{\circ}\text{C}$, $I = 0.2\text{mA}$, UCCx813-3/-5	3.94	4.00	4.06	V
Load Regulation	$0.2\text{mA} < I < 5\text{mA}$		10	30	mV
Total Variation	UCCx813 -0-1/-2/-4 (Note 7)	4.84	5.00	5.10	V
	UCCx813-5 (Note 7)	3.84	4.00	4.08	V
Output Noise Voltage	$10\text{Hz} \leq f \leq 10\text{kHz}$, $T_J = +25^{\circ}\text{C}$ (Note 9)		70		μV
Long Term Stability	$T_A = +125^{\circ}\text{C}$, 1000 Hours (Note 9)		5		mV
Output Short Circuit		-5		-35	mA
Oscillator Section					
Oscillator Frequency	UCCx813-0/-1/-2/-4 (Note 4)	40	46	52	kHz
	UCCx813-3/-5 (Note 4)	26	31	36	kHz
Temperature Stability	(Note 9)		2.5		%
Amplitude Peak-to-Peak		2.25	2.40	2.55	V
Oscillator Peak Voltage			2.45		V
Error Amplifier Section					
Input Voltage	COMP = 2.5V; UCCx813-0/-1/-2/-4	2.42	2.50	2.56	V
	COMP = 2.0V; UCCx813-3/-5	1.92	2.0	2.05	V
Input Bias Current		-2		2	μA
Open Loop Voltage Gain		60	80		dB
COMP Sink Current	FB = 2.7V, COMP = 1.1V	0.4		2.5	mA
COMP Source Current	FB = 1.8V, COMP = REF - 1.2V	-0.2	-0.5	-0.8	mA
Gain Bandwidth Product	(Note 9)		2		MHz
PWM Section					
Maximum Duty Cycle	UCCx813-0/-2/-3	97	99	100	%
	UCCx813-1/-4/-5	48	49	50	%
Minimum Duty Cycle	COMP = 0V			0	%
Current Sense Section					
Gain	(Note 5)	1.10	1.65	1.80	V/V
Maximum Input Signal	COMP = 5V (Note 6)	0.9	1.0	1.1	V
Input Bias Current		-200		200	nA
CS Blank Time		50	100	150	ns
Over-Current Threshold		1.32	1.55	1.70	V
COMP to CS Offset	CS = 0V	0.45	0.90	1.35	V

ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ for UCC2813-x; $0^{\circ}\text{C} \leq T_A \leq +70^{\circ}\text{C}$ for UCC3813-x; $V_{CC} = 10\text{V}$ (Note 3); $RT = 100\text{k}$ from REF to RC; $CT = 330\text{pF}$ from RC to GND; $0.1\mu\text{F}$ capacitor from VCC to GND; $0.1\mu\text{F}$ capacitor from VREF to GND. $T_A = T_J$.

PARAMETER	TEST CONDITIONS	UCC2813-x UCC3813-x			UNITS
		MIN	TYP	MAX	
Output Section					
OUT Low Level	I = 20mA, all parts		0.1	0.4	V
	I = 200mA, all parts		0.35	0.90	V
	I = 50mA, VCC = 5V, UCCx813-3/-5		0.15	0.40	V
	I = 20mA, VCC = 0V, all parts		0.7	1.2	V
OUT High V _{SAT} (V _{CC} -OUT)	I = -20mA, all parts		0.15	0.40	V
	I = -200mA, all parts		1.0	1.9	V
	I = -50mA, VCC = 5V, UCCx813-3/-5		0.4	0.9	V
Rise Time	C _L = 1nF		41	70	ns
Fall Time	C _L = 1nF		44	75	ns
Undervoltage Lockout Section					
Start Threshold (Note 8)	UCCx813-0	6.6	7.2	7.8	V
	UCCx813-1	8.6	9.4	10.2	V
	UCCx813-2/-4	11.5	12.5	13.5	V
	UCCx813-3/-5	3.7	4.1	4.5	V
Stop Threshold (Note 8)	UCC1813-0	6.3	6.9	7.5	V
	UCC1813-1	6.8	7.4	8.0	V
	UCCx813-2/-4	7.6	8.3	9.0	V
	UCCx813-3/-5	3.2	3.6	4.0	V
Start to Stop Hysteresis	UCCx813-0	0.12	0.3	0.48	V
	UCCx813-1	1.6	2	2.4	V
	UCCx813-2/-4	3.5	4.2	5.1	V
	UCCx813-3/-5	0.2	0.5	0.8	V
Soft Start Section					
COMP Rise Time	FB = 1.8V, Rise from 0.5V to REF-1V		4		ms
Overall Section					
Start-up Current	VCC < Start Threshold		0.1	0.23	mA
Operating Supply Current	FB = 0V, CS = 0V, RC = 0V		0.5	1.2	mA
VCC Internal Zener Voltage	ICC = 10mA (Note 8)	12	13.5	15	V
VCC Internal Zener Voltage Minus Start Threshold Voltage	UCCx813-2/-4	0.5	1.0		V

Note 3: Adjust VCC above the start threshold before setting at 10V.

Note 4: Oscillator frequency for the UCCx813-0, UCCx813-2 and UCCx813-3 is the output frequency.

Oscillator frequency for the UCCx813-1, UCCx813-4 and UCCx813-5 is twice the output frequency.

Note 5: Gain is defined by: $A = \frac{\Delta V_{COMP}}{\Delta V_{CS}}$ $0 \leq V_{CS} \leq 0.8\text{V}$.

Note 6: Parameter measured at trip point of latch with Pin 2 at 0V.

Note 7: Total Variation includes temperature stability and load regulation.

Note 8: Start Threshold, Stop Threshold and Zener Shunt Thresholds track one another.

Note 9: Ensured by design. Not 100% tested in production.

PIN DESCRIPTIONS (cont.)

COMP: COMP is the output of the error amplifier and the input of the PWM comparator.

Unlike other devices, the error amplifier in the UCC3813 family is a true, low output-impedance, 2MHz operational amplifier. As such, the COMP terminal can both source and sink current. However, the error amplifier is internally current limited, so that you can command zero duty cycle by externally forcing COMP to GND.

The UCC3813 family features built-in full cycle Soft Start. Soft Start is implemented as a clamp on the maximum COMP voltage.

FB: FB is the inverting input of the error amplifier. For best stability, keep FB lead length as short as possible and FB stray capacitance as small as possible.

CS: CS is the input to the current sense comparators. The UCC3813 family has two different current sense comparators: the PWM comparator and an over-current comparator.

The UCC3813 family contains digital current sense filtering, which disconnects the CS terminal from the current sense comparator during the 100ns interval immediately following the rising edge of the OUT pin. This digital filtering, also called leading-edge blanking, means that in most applications, no analog filtering (RC filter) is required on CS. Compared to an external RC filter technique, the leading-edge blanking provides a smaller effective CS to OUT propagation delay. Note, however, that the minimum non-zero On-Time of the OUT signal is directly affected by the leading-edge-blanking and the CS to OUT propagation delay.

The over-current comparator is only intended for fault sensing, and exceeding the over-current threshold will cause a soft start cycle.

RC: RC is the oscillator timing pin. For fixed frequency operation, set timing capacitor charging current by connecting a resistor from REF to RC. Set frequency by connecting a timing capacitor from RC to GND. For best performance, keep the timing capacitor lead to GND as short and direct as possible. If possible, use separate ground traces for the timing capacitor and all other functions.

The frequency of oscillation can be estimated with the following equations:

$$\text{UCCx813-0/-1/-2/-4: } F = \frac{1.5}{R \cdot C}$$

$$\text{UCCx813-3, UCCx813-5: } F = \frac{1.0}{R \cdot C}$$

where frequency is in Hz, resistance is in Ω , and capacitance is in farads. The recommended range of timing resistors is between 10k and 200k and timing capacitor is 100pF to 1000pF. Never use a timing resistor less than 10k.

GND: GND is reference ground and power ground for all functions on this part.

OUT: OUT is the output of a high-current power driver capable of driving the gate of a power MOSFET with peak currents exceeding $\pm 750\text{mA}$. OUT is actively held low when VCC is below the UVLO threshold.

The high-current power driver consists of FET output devices, which can switch all of the way to GND and all of the way to VCC. The output stage also provides a very low impedance to overshoot and undershoot. This means that in many cases, external schottky clamp diodes are not required.

VCC: VCC is the power input connection for this device. In normal operation VCC is powered through a current limiting resistor. Although quiescent VCC current is very low, total supply current will be higher, depending on OUT current. Total VCC current is the sum of quiescent VCC current and the average OUT current. Knowing the operating frequency and the MOSFET gate charge (Q_g), average OUT current can be calculated from:

$$I_{OUT} = Q_g \cdot F.$$

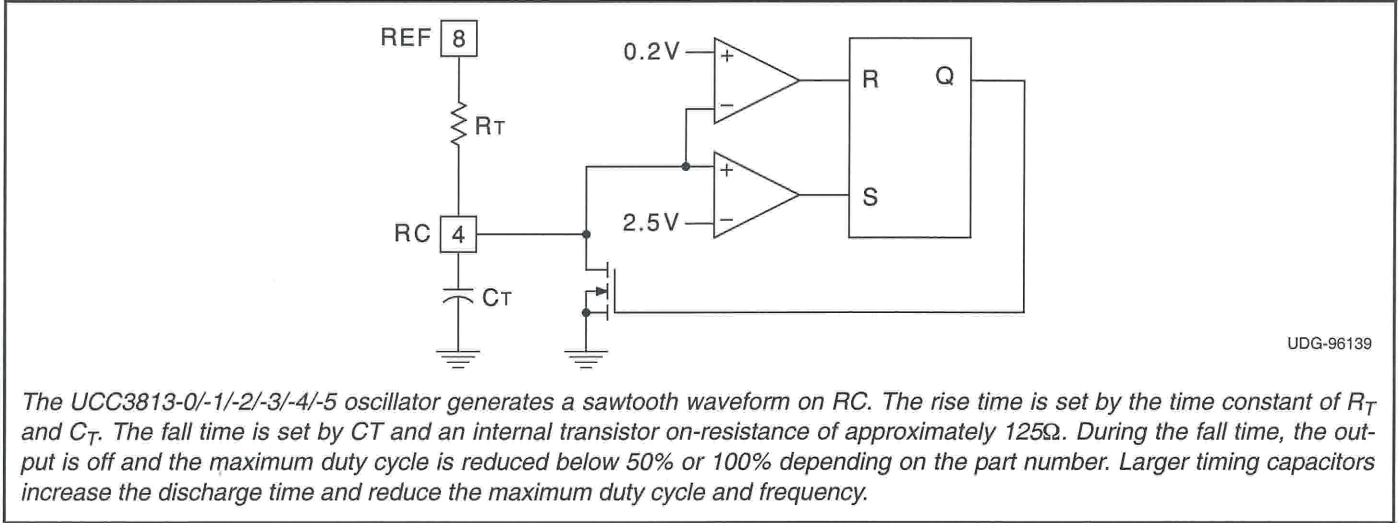
To prevent noise problems, bypass VCC to GND with a 0.1 μF ceramic capacitor in parallel as close to the VCC pin as possible. An electrolytic capacitor may also be used in addition to the ceramic capacitor.

REF: REF is the voltage reference for the error amplifier and also for many other functions on the IC. REF is also used as the logic power supply for high speed switching logic on the IC.

When VCC is greater than 1V and less than the UVLO threshold, REF is pulled to ground through a 5k Ω resistor. This means that REF can be used as a logic output indicating power system status. It is important for reference stability that REF is bypassed to GND with a ceramic capacitor as close to the pin as possible. An electrolytic capacitor may also be used in addition to the ceramic capacitor. A minimum of 0.1 μF ceramic is required. Additional REF bypassing is required for external loads greater than 2.5mA on the reference.

To prevent noise problems with high speed switching transients, bypass REF to ground with a ceramic capacitor very close to the IC package.

APPLICATION INFORMATION



The UCC3813-0/-1/-2/-3/-4/-5 oscillator generates a sawtooth waveform on RC. The rise time is set by the time constant of R_T and C_T . The fall time is set by C_T and an internal transistor on-resistance of approximately 125Ω . During the fall time, the output is off and the maximum duty cycle is reduced below 50% or 100% depending on the part number. Larger timing capacitors increase the discharge time and reduce the maximum duty cycle and frequency.

Figure 1. Oscillator.

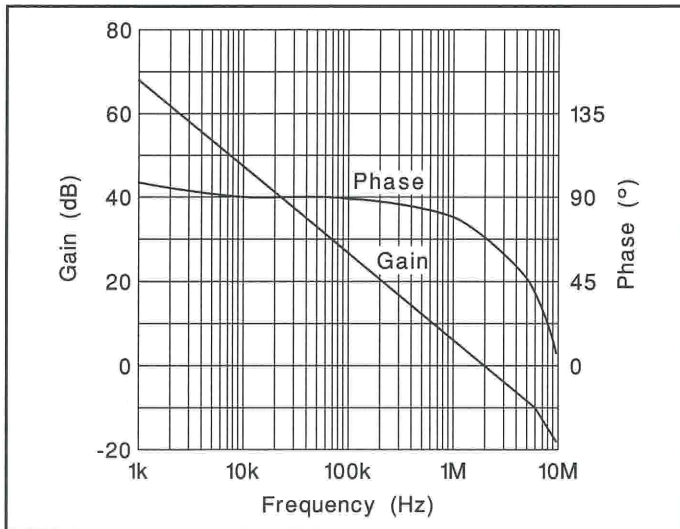


Figure 2. Error amplifier gain/phase response.

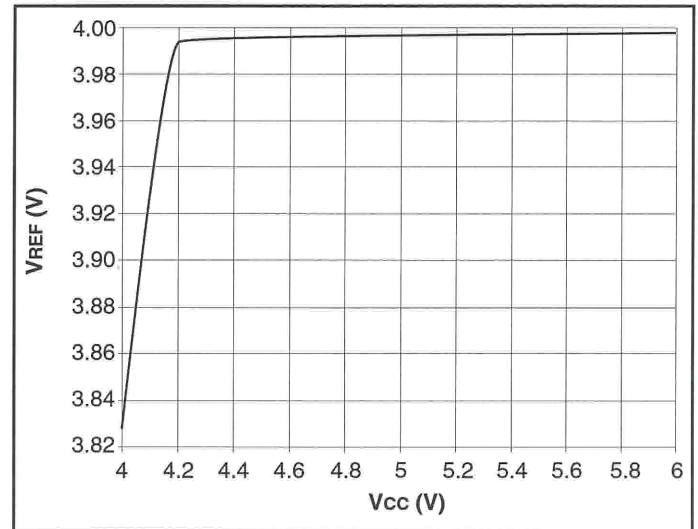


Figure 5. UCC3813-3/5 V_{REF} vs. V_{CC} ; $I_{LOAD} = 0.5mA$.

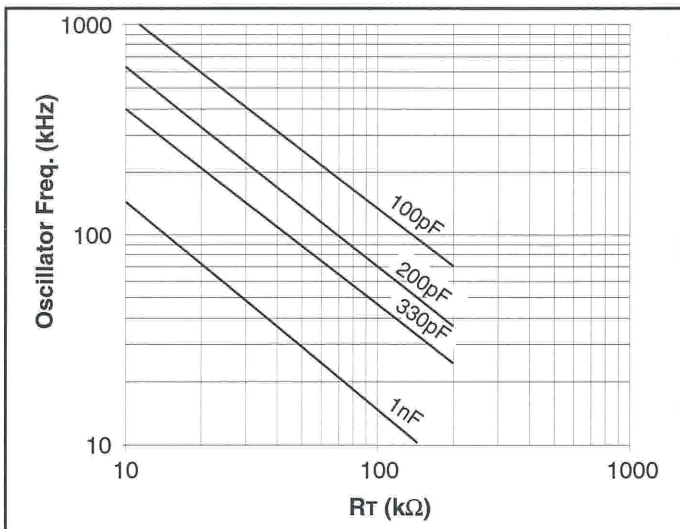


Figure 3. UCC3813-0/-1/-2/-4 oscillator frequency vs. R_T and C_T .

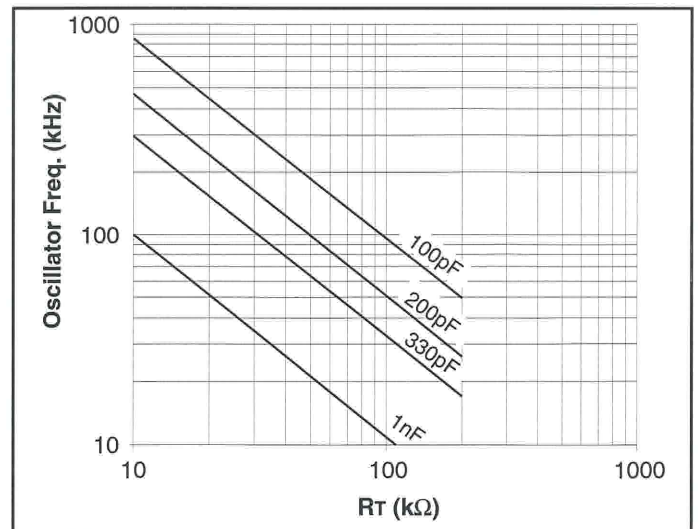


Figure 6. UCC3813-3/5 oscillator frequency vs. R_T and C_T .

APPLICATION INFORMATION (cont.)

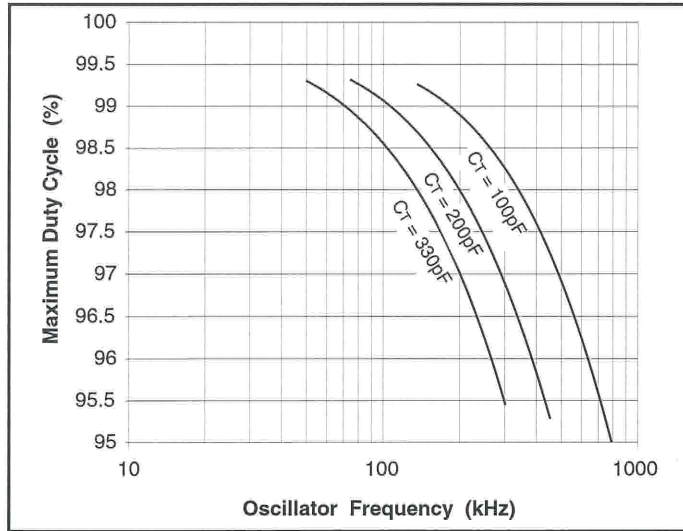


Figure 4. UCC3813-0/-2/-3 max. duty cycle vs. oscillator frequency.

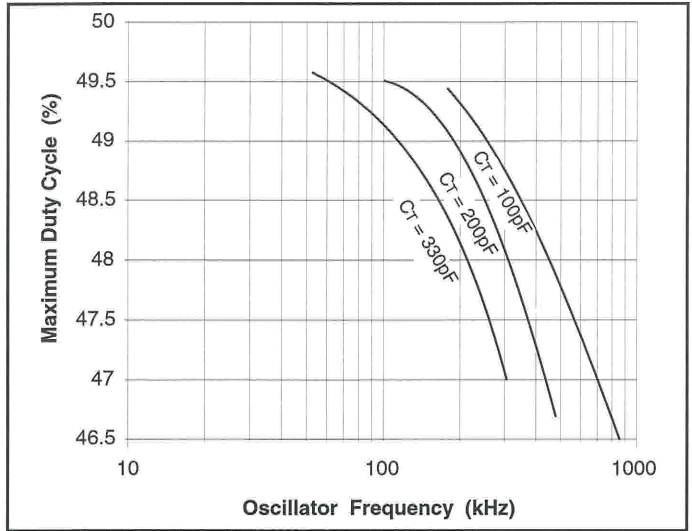


Figure 7. UCC3813-1/-4/-5 max. duty cycle vs. oscillator frequency.

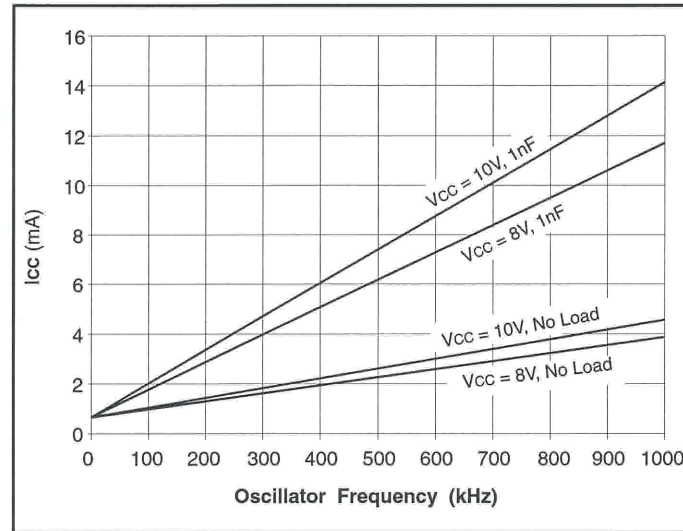


Figure 8. UCC3813-0 I_{CC} vs. oscillator frequency.

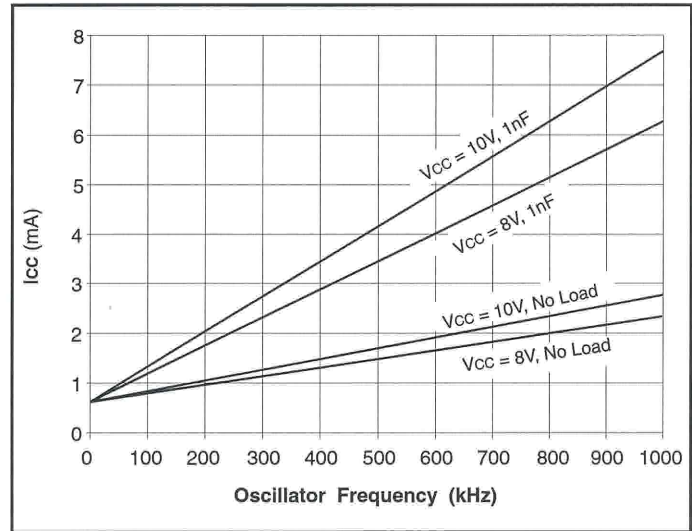


Figure 10. UCC3813-5 I_{CC} vs. oscillator frequency.

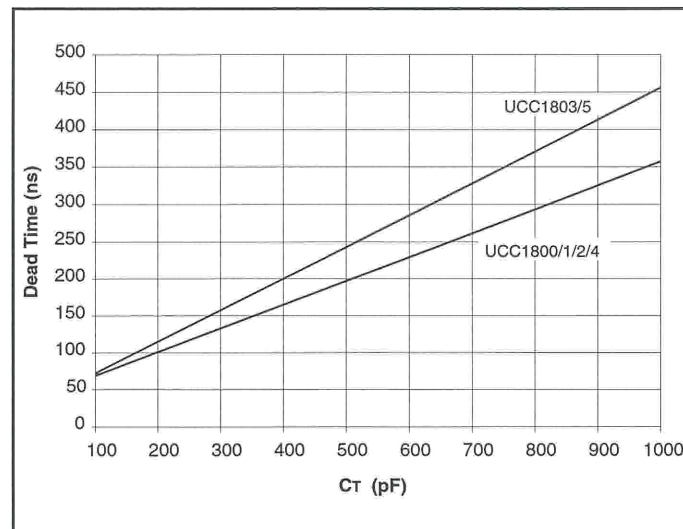


Figure 9. Dead time vs. C_T , $R_T = 100k$.

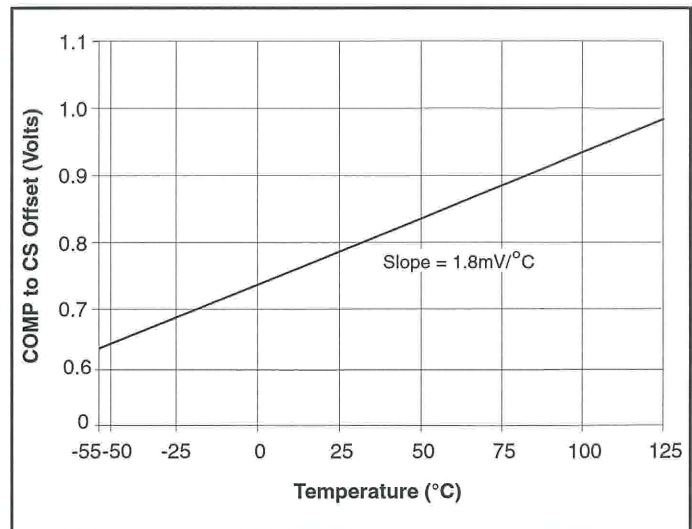


Figure 11. COMP to CS offset vs. temperature, $CS = 0V$.

REVISION HISTORY

8/2010 Revision B to Revision C

Updated Abs Max Table to read:

Analog Inputs (FB, CS, RC, COMP).....-0.3V to the lesser of 6.3V or VCC + 0.3V

From: Analog Inputs (FB, CS).....-0.3V to 6.3V

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
HPA01061DTR-4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-0	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-0G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-1	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-1G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-2G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-3	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-3G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-4G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813D-5G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-0	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-0G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-1	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-1G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC2813DTR-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-2G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-3	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-3G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-4G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813DTR-5G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC2813N-0	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-0G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-1	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-1G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-2	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-2G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-3	ACTIVE		UTR			TBD	Call TI	Call TI	
UCC2813N-4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-4G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813N-5	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC2813N-5G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC2813PW-0	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-0G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-1	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-1G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-2G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-3	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-3G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-4G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-5	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PW-5G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-0	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-0G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-1	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-1G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-2	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC2813PWTR-2G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-3	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-3G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-4G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC2813PWTR-5G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813D-0	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-0G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-1	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-1G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-2	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-2G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-3	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-3G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-4G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813D-5	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC3813D-5G4	ACTIVE	SOIC	D	8	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-0	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-0G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-1	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-1G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-2	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-2G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-3	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-3G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-4G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-5	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813DTR-5G4	ACTIVE	SOIC	D	8	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
UCC3813N-0	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-0G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-1	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-1G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-2	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC3813N-2G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-3	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-3G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-4G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-5	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813N-5G4	ACTIVE	PDIP	P	8	50	Green (RoHS & no Sb/Br)	CU NIPDAU	N / A for Pkg Type	
UCC3813PW-0	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-0G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-1	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-1G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-2	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-2G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-3	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-3G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-4G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PW-5	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/ Ball Finish	MSL Peak Temp ⁽³⁾	Samples (Requires Login)
UCC3813PW-5G4	ACTIVE	TSSOP	PW	8	150	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-0	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-0G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-1	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-1G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-3	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-3G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-5	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
UCC3813PWTR-5G4	ACTIVE	TSSOP	PW	8	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSELETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

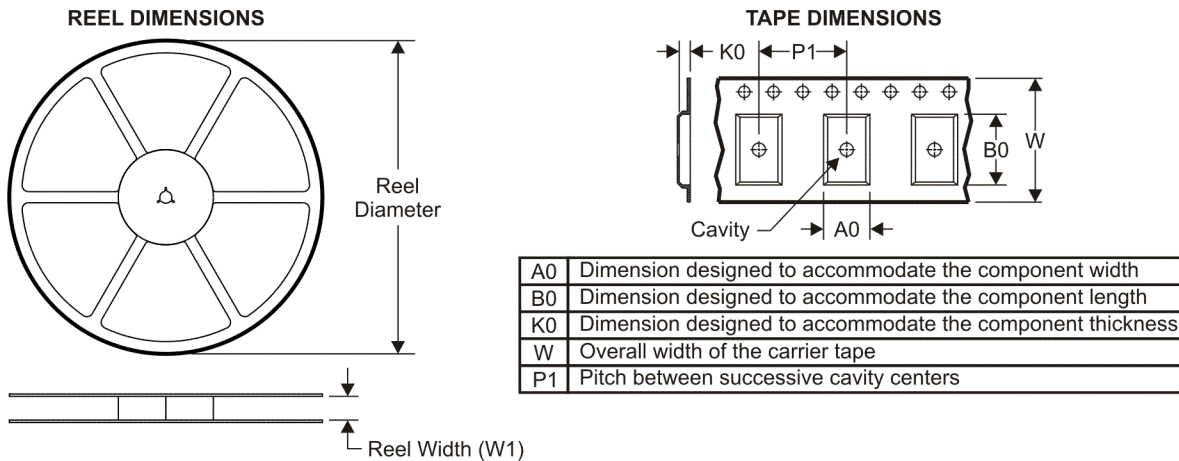
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

OTHER QUALIFIED VERSIONS OF UCC2813-0, UCC2813-1, UCC2813-2, UCC2813-3, UCC2813-4, UCC2813-5 :

- Automotive: [UCC2813-0-Q1](#), [UCC2813-1-Q1](#), [UCC2813-2-Q1](#), [UCC2813-3-Q1](#), [UCC2813-4-Q1](#), [UCC2813-5-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

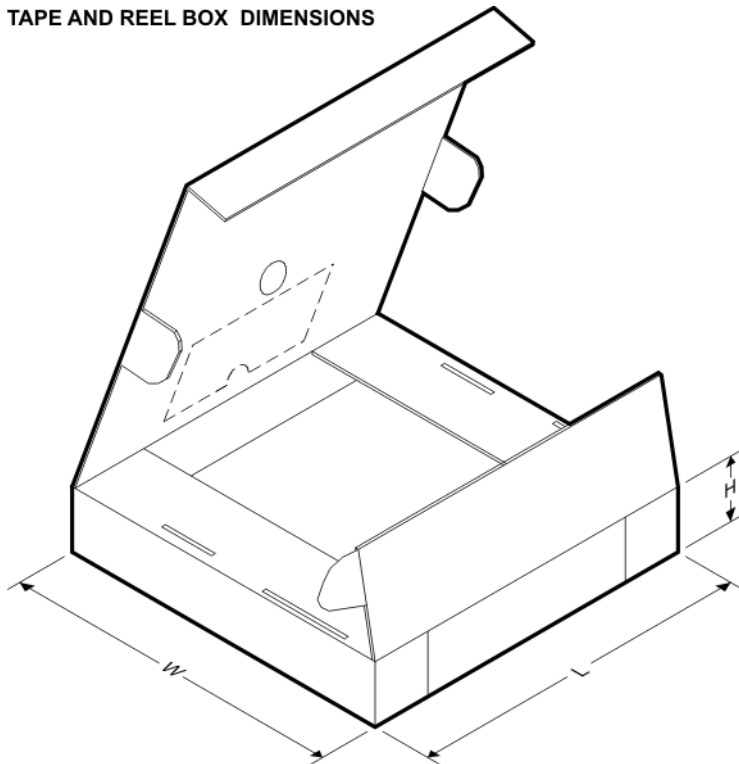
TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
UCC2813DTR-0	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813DTR-1	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813DTR-2	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813DTR-3	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813DTR-4	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813DTR-5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC2813PWTR-0	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC2813PWTR-1	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC2813PWTR-2	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC2813PWTR-3	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC2813PWTR-4	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC2813PWTR-5	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC3813DTR-0	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC3813DTR-1	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC3813DTR-2	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC3813DTR-3	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC3813DTR-4	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
UCC3813DTR-5	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
UCC3813PWTR-0	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC3813PWTR-1	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC3813PWTR-3	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1
UCC3813PWTR-5	TSSOP	PW	8	2000	330.0	12.4	7.0	3.6	1.6	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UCC2813DTR-0	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813DTR-1	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813DTR-2	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813DTR-3	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813DTR-4	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813DTR-5	SOIC	D	8	2500	340.5	338.1	20.6
UCC2813PWTR-0	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC2813PWTR-1	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC2813PWTR-2	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC2813PWTR-3	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC2813PWTR-4	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC2813PWTR-5	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC3813DTR-0	SOIC	D	8	2500	340.5	338.1	20.6

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
UCC3813DTR-1	SOIC	D	8	2500	340.5	338.1	20.6
UCC3813DTR-2	SOIC	D	8	2500	340.5	338.1	20.6
UCC3813DTR-3	SOIC	D	8	2500	340.5	338.1	20.6
UCC3813DTR-4	SOIC	D	8	2500	340.5	338.1	20.6
UCC3813DTR-5	SOIC	D	8	2500	340.5	338.1	20.6
UCC3813PWTR-0	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC3813PWTR-1	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC3813PWTR-3	TSSOP	PW	8	2000	346.0	346.0	29.0
UCC3813PWTR-5	TSSOP	PW	8	2000	346.0	346.0	29.0

P (R-PDIP-T8)

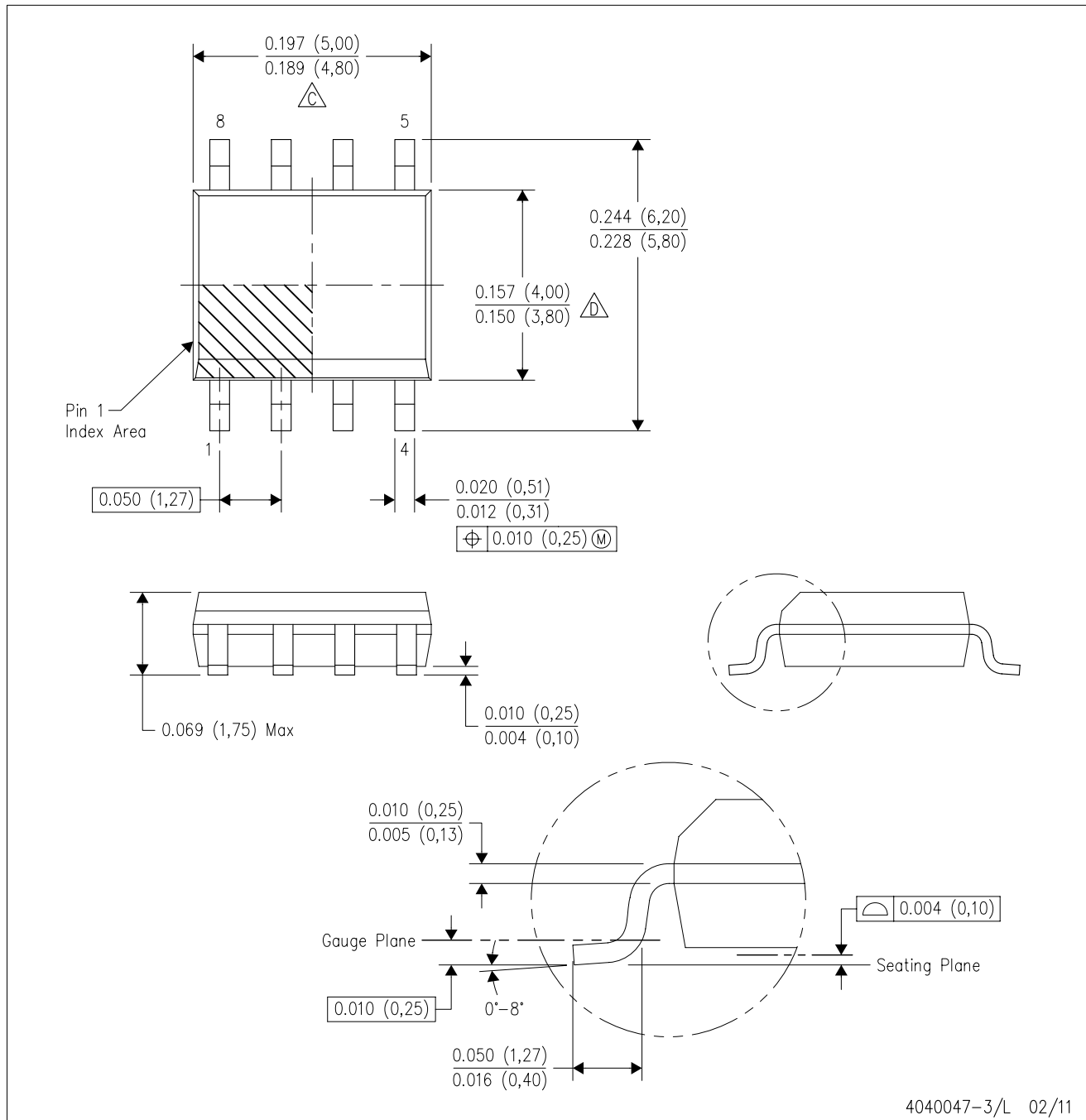
PLASTIC DUAL-IN-LINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Falls within JEDEC MS-001 variation BA.

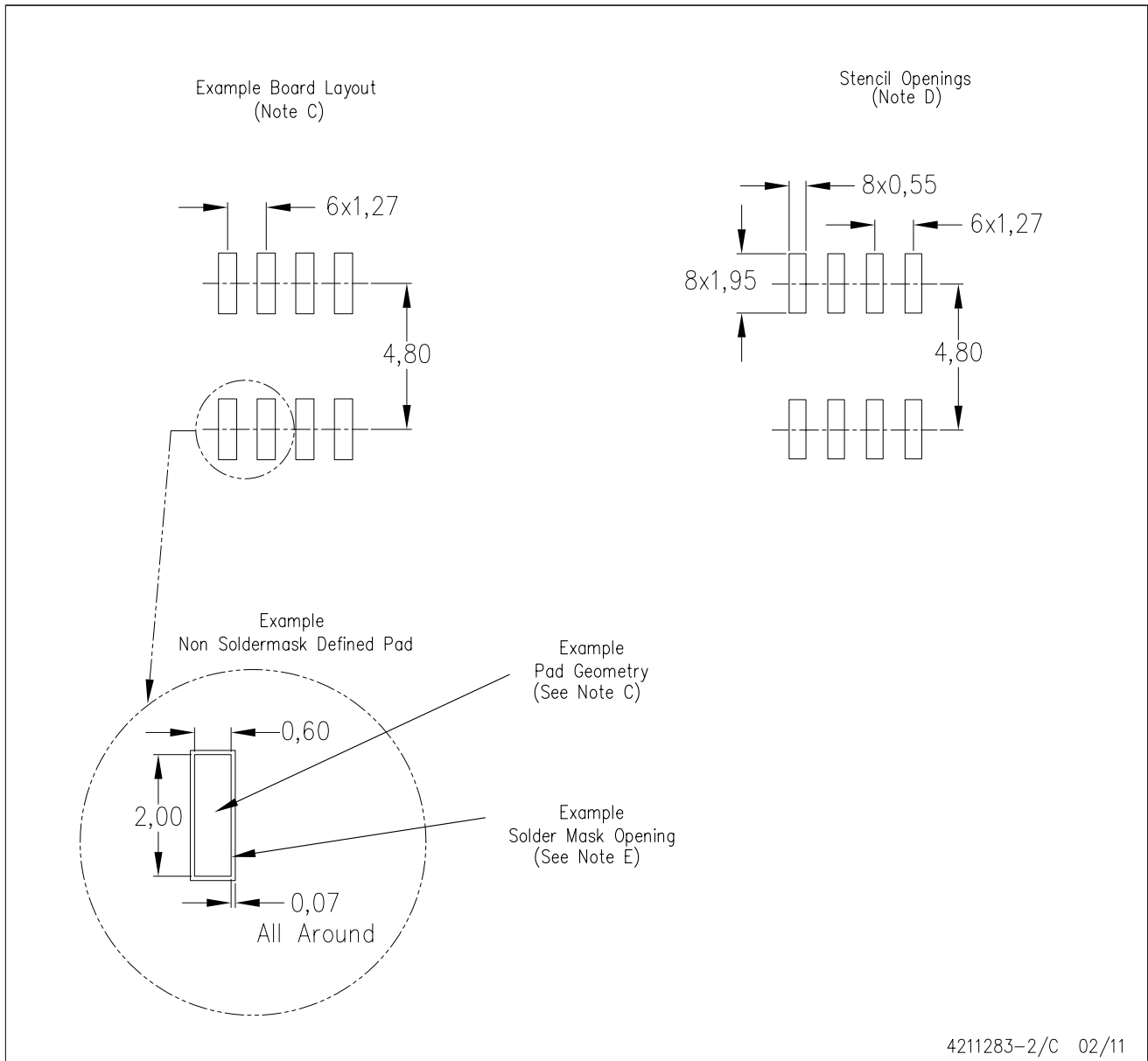
D (R-PDSO-G8)

PLASTIC SMALL OUTLINE



D (R-PDSO-G8)

PLASTIC SMALL OUTLINE

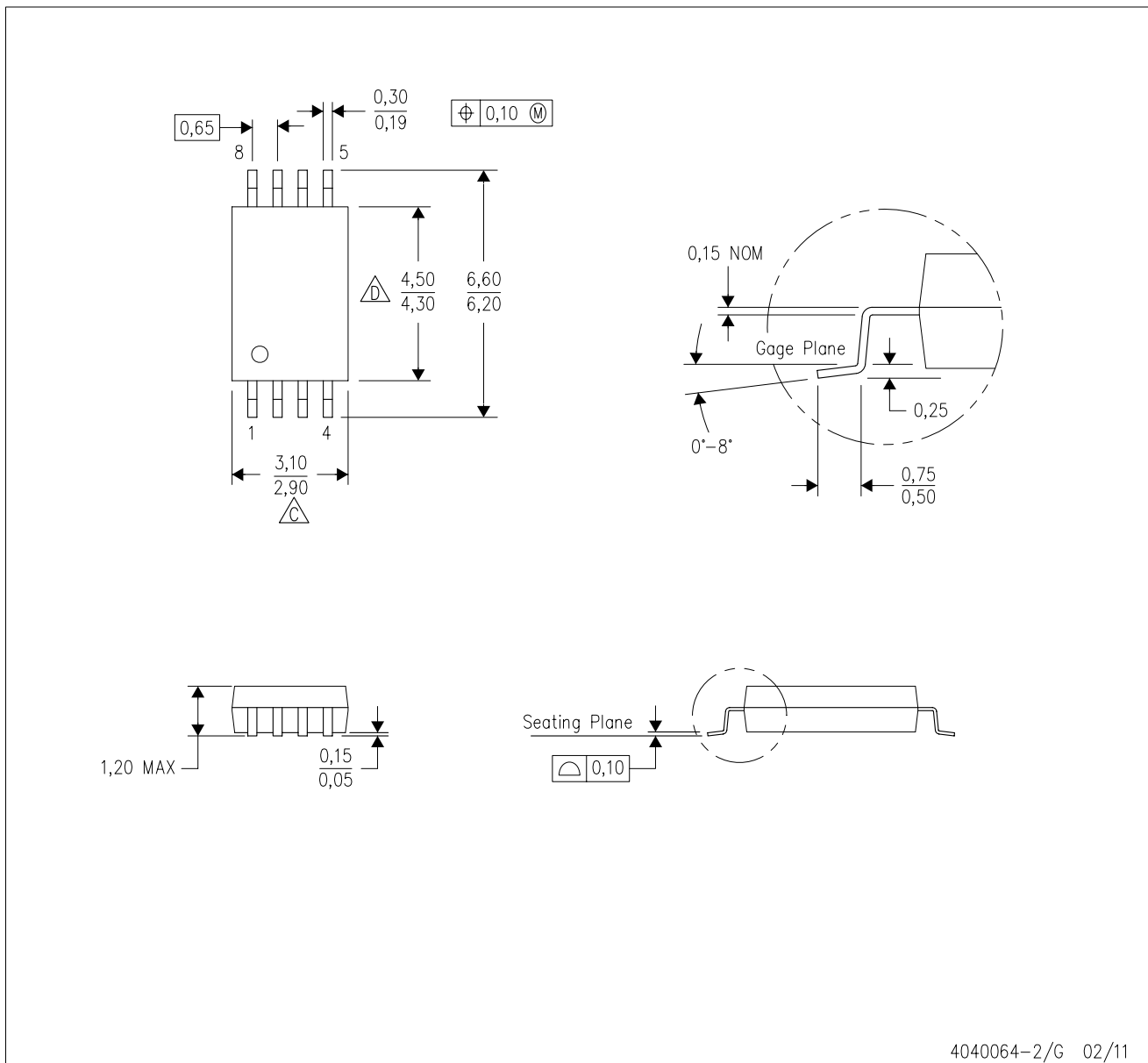




4211283-2/C 02/11

- NOTES:
- All linear dimensions are in millimeters.
 - This drawing is subject to change without notice.
 - Publication IPC-7351 is recommended for alternate designs.
 - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
 - Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

PW (R-PDSO-G8)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M-1994.
 - B. This drawing is subject to change without notice.
 -  Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
 -  Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
 - E. Falls within JEDEC MO-153

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video
Wireless	www.ti.com/wireless-apps

TI E2E Community Home Page

e2e.ti.com

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2011, Texas Instruments Incorporated