

1.Description

The UMW UCC27714DR is a high voltage, high speed power MOSFET drivers with dependent high and low-side referenced output channels. Proprietary HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. The logic input is compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET in the high-side configuration which operates up to 700V.

3.Features

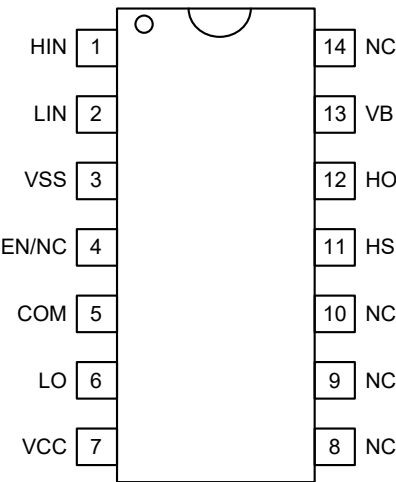
- Floating channel designed for bootstrap operation
- Fully operational to +700 V
- 3.3V, 5V and 15V input logic compatible
- dV/dt noise Immunity ± 50 V/nsec
- Allowable negative V_s capability: -9V
- Gate drive supply range from 10V to 20V
- Typically output Source/Sink current capability: 4A/4A

2.Applications

- Motor Control
- Air Conditioners/ Washing Machines
- General Purpose Inverters
- Micro/Mini Inverter Drives
- Undervoltage lockout for both channels
 - UVLO forward 8.9V
 - UVLO reverse 8.2V
- Turn-on/Turn-off propagation delay -
 - Ton/Toff = 130ns/130ns
- Matched propagation delay for both channels
- RoSH compatible



4.Pinning Information



SOP-14

Lead Definitions

Number	Symbol	Description
1	HIN	Logic input for high side gate driver output (HO), in phase
2	LIN	Logic input for low side gate driver output (LO), in phase
3	VSS	Logic ground
4	EN/NC	Enable input for high-side and low-side driver. This pin biased LOW, disables both HO and LO regardless of HI and LI state, This pin biased high or floating enables both HO and LO.
5	COM	Low side return
6	LO	Low side gate drive output
7	VCC	Low side and logic fixed supply
8	NC	No connect
9	NC	No connect
10	NC	No connect
11	HS	High side floating supply return
12	HO	High side gate drive output
13	VB	High side floating supply
14	NC	No connect



5. Absolute Maximum Ratings ⁽¹⁾⁽²⁾

Over operating free-air temperature range (unless otherwise noted), all voltages are with respect to COM (unless otherwise noted), currents are positive into and negative out of the specified terminal. ⁽¹⁾

Parameter		Symbol	Min	Max	Units
Input voltage range	HIN, LIN, EN ⁽³⁾ with respect to VSS	V_{IN}	-5	20	V
	VCC supply voltage		-0.3	20	V
	VB		-0.3	640	V
	VB-HS		-0.3	20	V
Output voltage range, HO	DC	V_{OUT}	HS-0.3	VB+0.3	V
	Transient, less than 100 ns ⁽⁴⁾		HS-2	VB+0.3	V
Output voltage range, LO	DC		-0.3	VCC+0.3	V
	Transient, less than 100 ns ⁽⁴⁾		-2	VCC+0.3	V
Logic ground, With respect to COM			-7	6	V
Logic ground, VCC-VSS			-0.3	20	V
Output current, HO, LO, IOUT_PULSED (100 ns)		I_{OUT}		±4	A
Output current, HO, LO, IOUT_DC		I_{OUT}		0.25	A
Allowable offset supply voltage transient		dV_{HS}/dt	-50	50	V/ns
Lead temperature (soldering, 10 second)				300	°C
Junction temperature range		T_J	-40	150	°C
Storage temperature range		T_{STG}	-65	150	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) See Packaging Section of the datasheet for thermal limitations and considerations of packages.

(3) The maximum voltage on the Input pins is not restricted by the voltage on the VCC pin.

(4) Values are verified by characterization on bench.



6.Recommended Operating Conditions

For proper operation, the device should be used under the following recommended conditions. The bias ratings of V_S and V_{SS} are measured at a supply voltage of 15V, and unless otherwise specified, the ratings of all voltage parameters are referenced to V_{SS} and the ambient temperature is 25°C.

Parameter	Symbol	Min	Max	Units
High side floating supply	V_B	$V_S + 10$	$V_S + 20$	V
High side floating supply return	V_S	-9	700	V
High side gate drive output	V_{HO}	V_S	V_B	V
Low side and main power supply	V_{CC}	10	20	V
Low side gate drive output	V_{LO}	0	V_{CC}	V
Logic input of HIN & LIN	V_{IN}	0	V_{CC}	V
Logic ground	V_{SS}	-5	5	V
Ambient temperature	T_A	-40	125	°C



7. Electrical Characteristics

Valid for temperature range at $T_A=25^{\circ}\text{C}$, $V_{CC}=V_B=15\text{V}$, $C_L=1\text{nF}$, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-on propagation delay	t_{ON}	$V_S=0\text{V}$		130	220	ns
Turn-off propagation delay	t_{OFF}	$V_S=0\text{V}$ or 700V		130	220	ns
Shut-down propagation delay	t_{sd}			130	220	ns
Turn-on rise time	t_R	$V_S=0\text{V}$		40	60	ns
Turn-off fall time	t_F	$V_S=0\text{V}$		20	35	ns
Matched propagation time delay	MT				50	ns
V_{CC} supply UVLO threshold	V_{CCUV+}		8	8.9	9.8	V
	V_{CCUV-}		7.4	8.2	9	V
Hysteresis of V_{CC} UVLO	$V_{CCUVHYS}$			0.7		V
V_{BS} supply UVLO threshold	V_{BSUV+}		8	8.9	9.8	V
	V_{BSUV-}		7.4	8.2	9	V
hysteresis of V_{BS} UVLO	$V_{BSUVHYS}$			0.7		V
High-side floating supply leakage current	I_{LK}	$V_B=V_S=700\text{V}$			50	μA
Quiescent V_B supply current	I_{QBS}	$V_{IN}=0\text{V}$ or 5V		120	300	μA
Quiescent V_{CC} supply current	I_{QCC}	$V_{IN}=0\text{V}$ or 5V		750	1000	μA
Logic "1" input voltage	V_{IH}	$V_{CC}=10\text{V}$ to 20V	2.5			V
Logic "0" input voltage	V_{IL}	$V_{CC}=10\text{V}$ to 20V			0.8	V
High level output voltage, $V_{BIAS}-V_O$	V_{OH}	$I_O=0\text{A}$			0.15	V
Low level output voltage, V_O	V_{OL}	$I_O=20\text{mA}$			0.1	V
Logic "1" input bias current	I_{IN+}	$V_{IN}=5\text{V}$		25	60	μA
Logic "0" input bias current	I_{IN-}	$V_{IN}=0\text{V}$			2	μA
Output high short circuit pulsed current	I_{O+}	$V_O=0\text{V}$, $PW\leq 10\mu\text{s}$	3	4		A
Output low short circuit pulsed current	I_{O-}	$V_O=15\text{V}$, $PW\leq 10\mu\text{s}$	3	4		A



8.Function Description

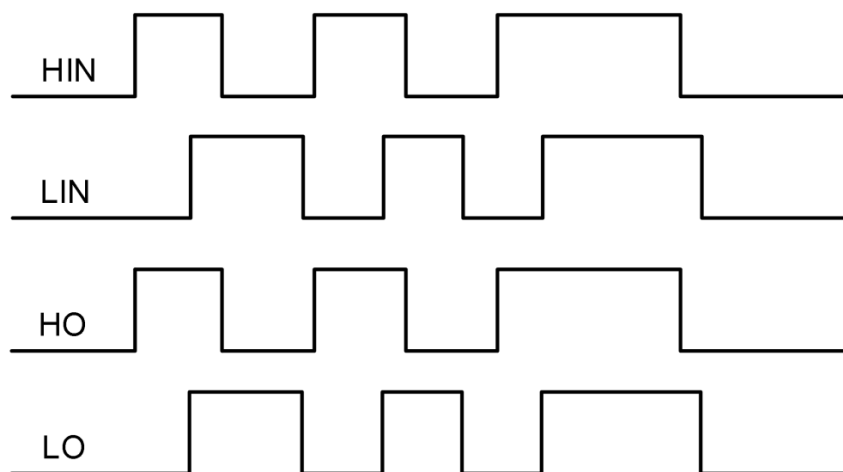


Figure 1. UMW UCC27714DR Input and output timing waveform

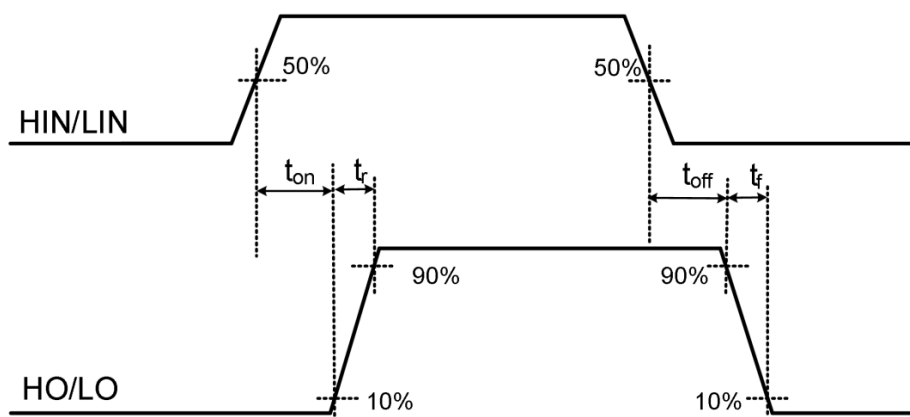


Figure 2. Propagation Time Waveform Definition



9.1 Typical Characteristic

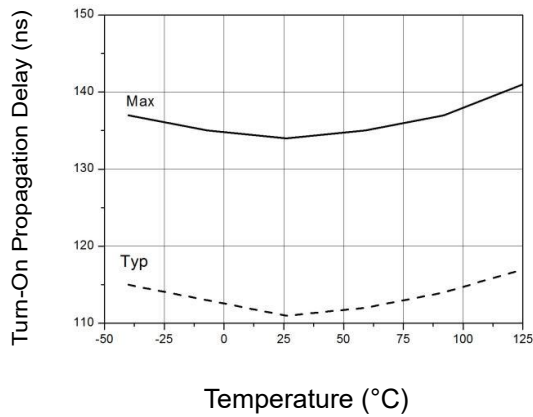


Figure 3: Turn-On Propagation Delay vs. Temperature

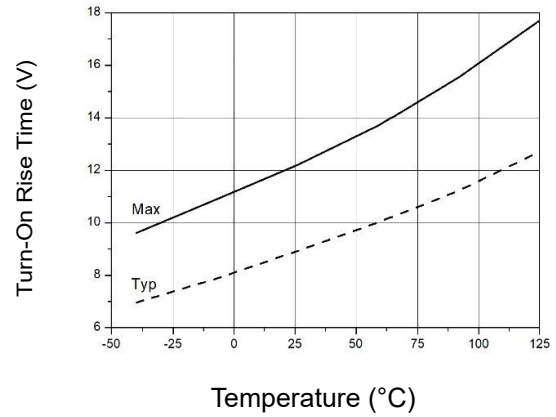


Figure 4: Turn-On Rise Time vs. Temperature

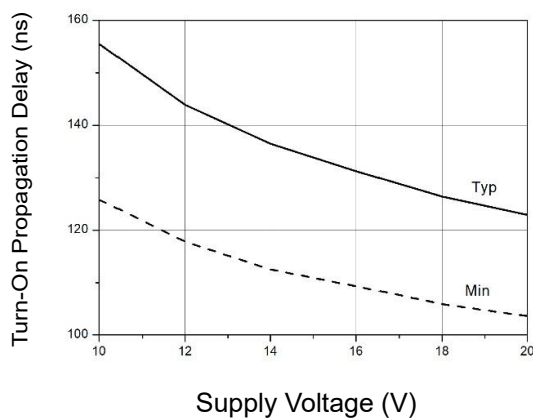


Figure 5: Turn-on Propagation Delay vs. Supply Voltage

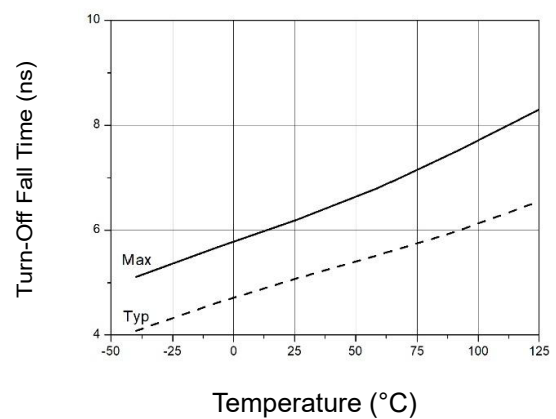


Figure 6: Turn-Off Fall Time vs. Temperature

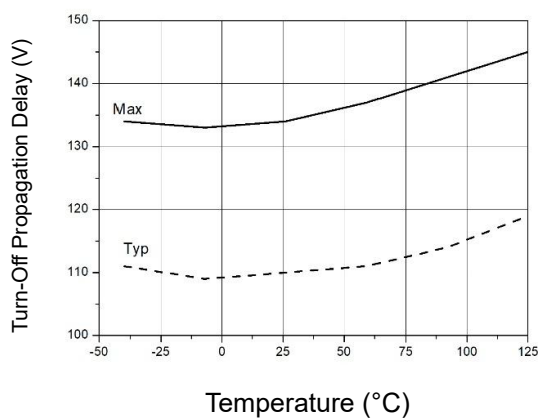


Figure 7: Turn-Off Propagation Delay vs. Temperature

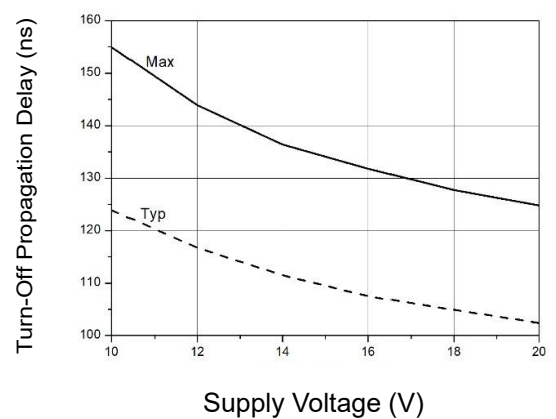
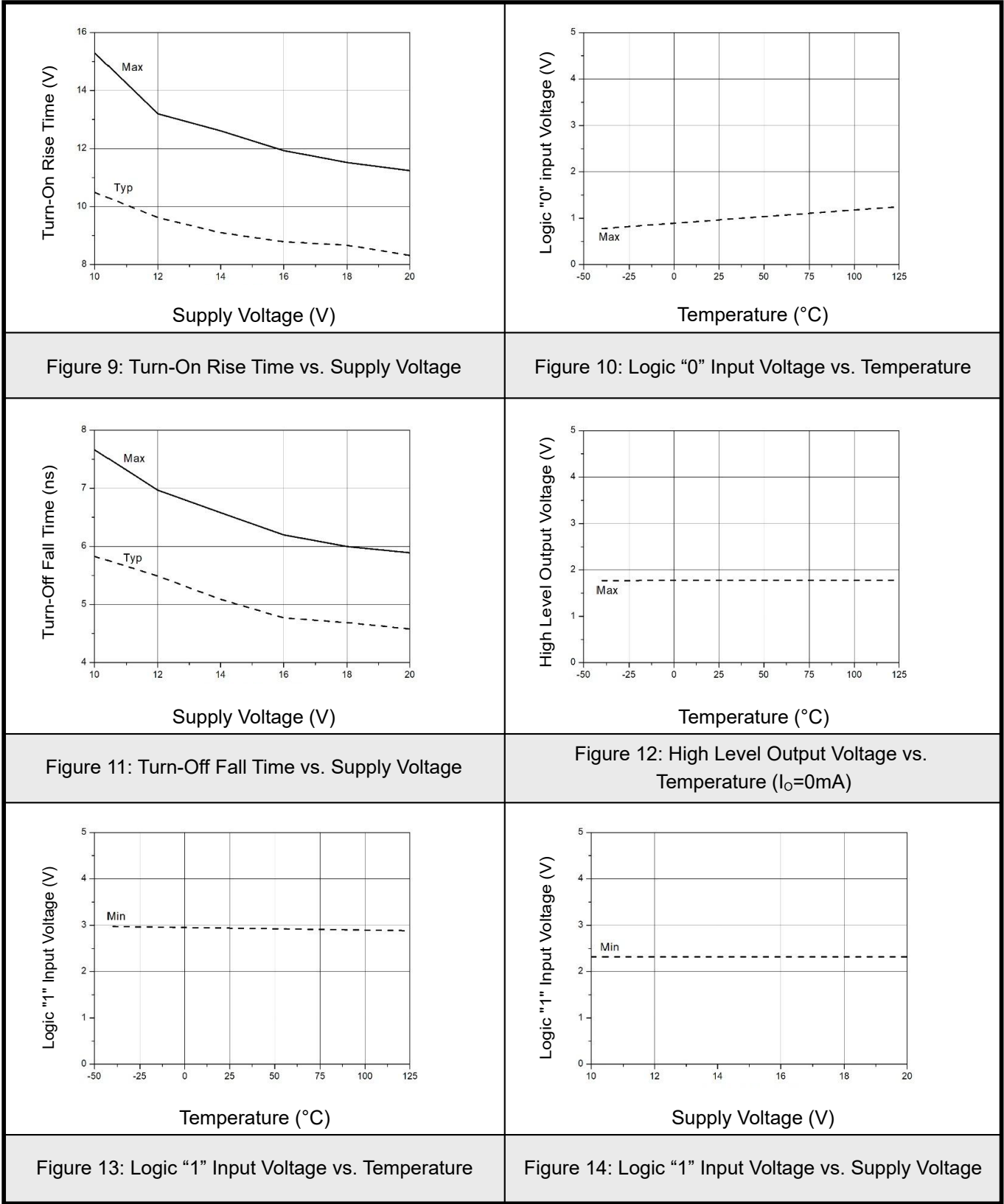


Figure 8: Turn-off Propagation Delay vs. Supply Voltage

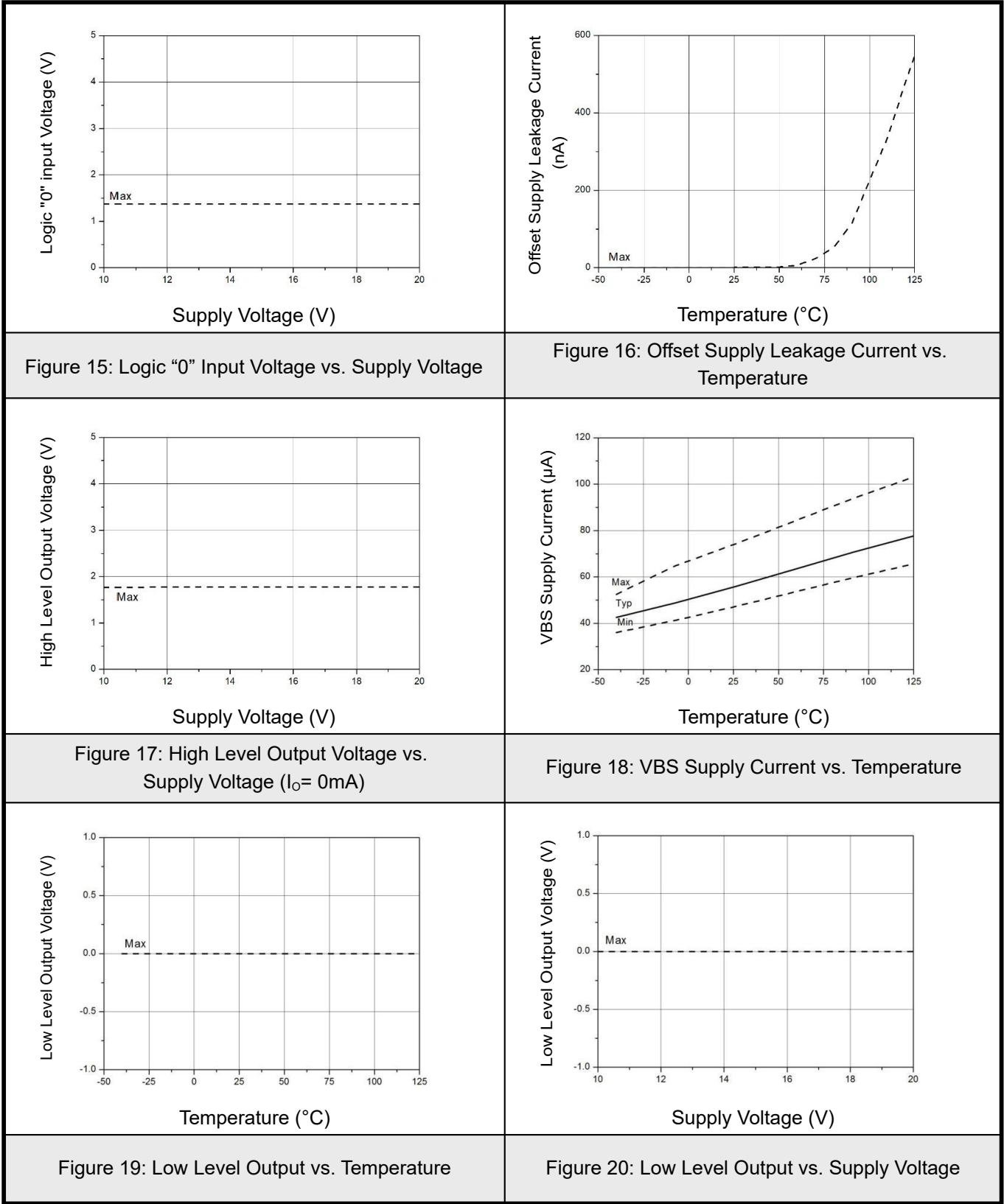


9.2 Typical Characteristic





9.3 Typical Characteristic





9.4 Typical Characteristic

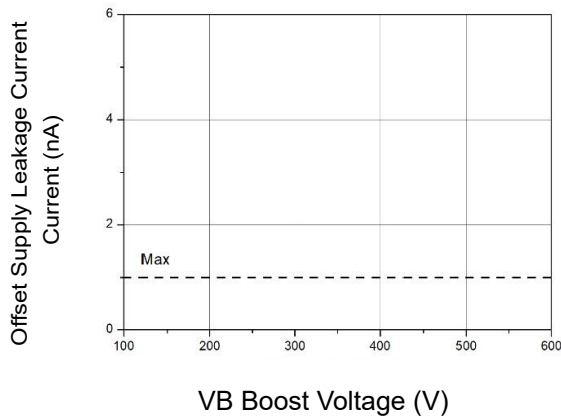


Figure 21: Offset Supply Leakage Current vs. VB Boost Voltage

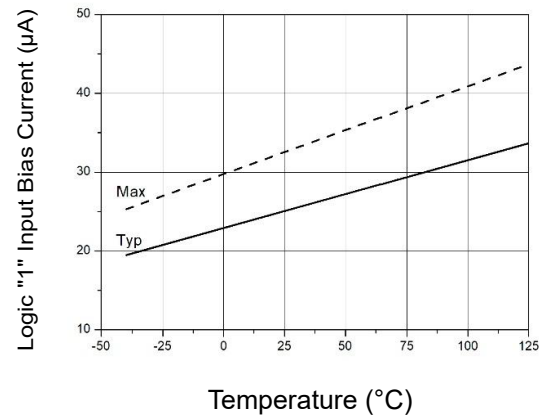


Figure 22: Logic "1" Input Bias Current vs. Temperature

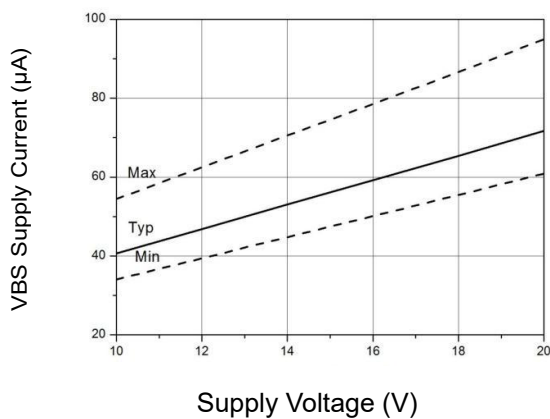


Figure 23: VBS Supply Current vs. VBS Floating Supply Voltage

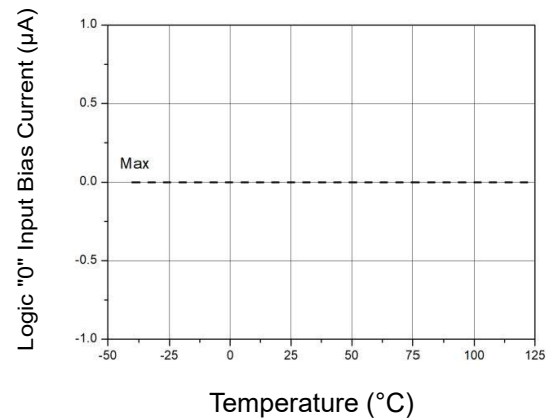


Figure 24: Logic "0" Input Bias Current vs. Temperature

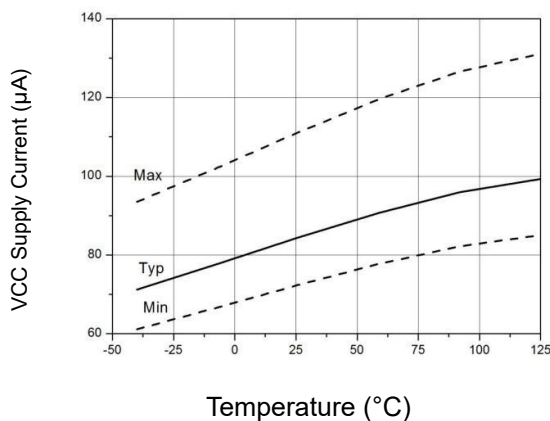


Figure 25: VCC Supply Current vs. Temperature

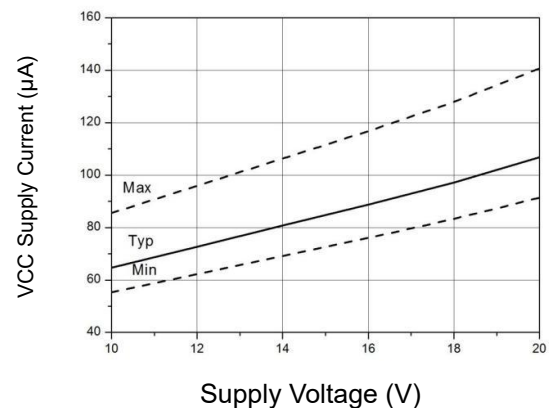


Figure 26: VCC Supply Current vs. Supply Voltage



9.5 Typical Characteristic

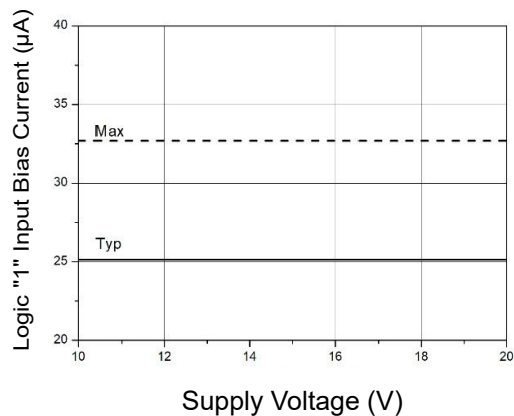


Figure 27: Logic "1" Input Bias Current vs. Supply Voltage

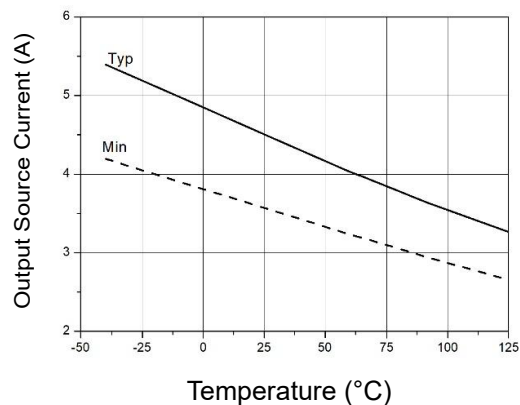


Figure 28: Output Source Current vs. Temperature

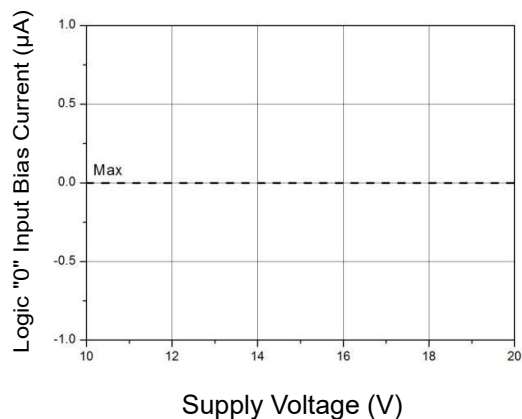


Figure 29: Logic "0" Input Bias Current vs. Supply Voltage

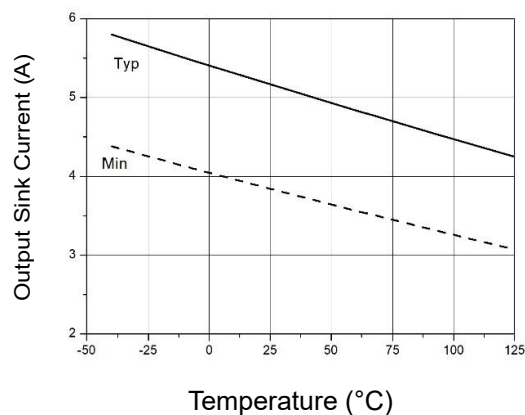


Figure 30: Output Sink Current vs. Temperature

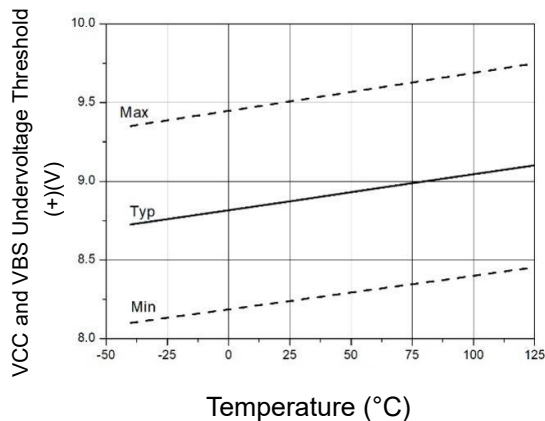


Figure 31: VCC and VBS Undervoltage Threshold (+) vs. Temperature

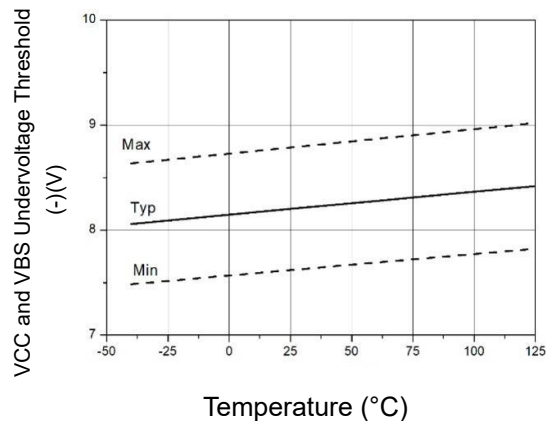
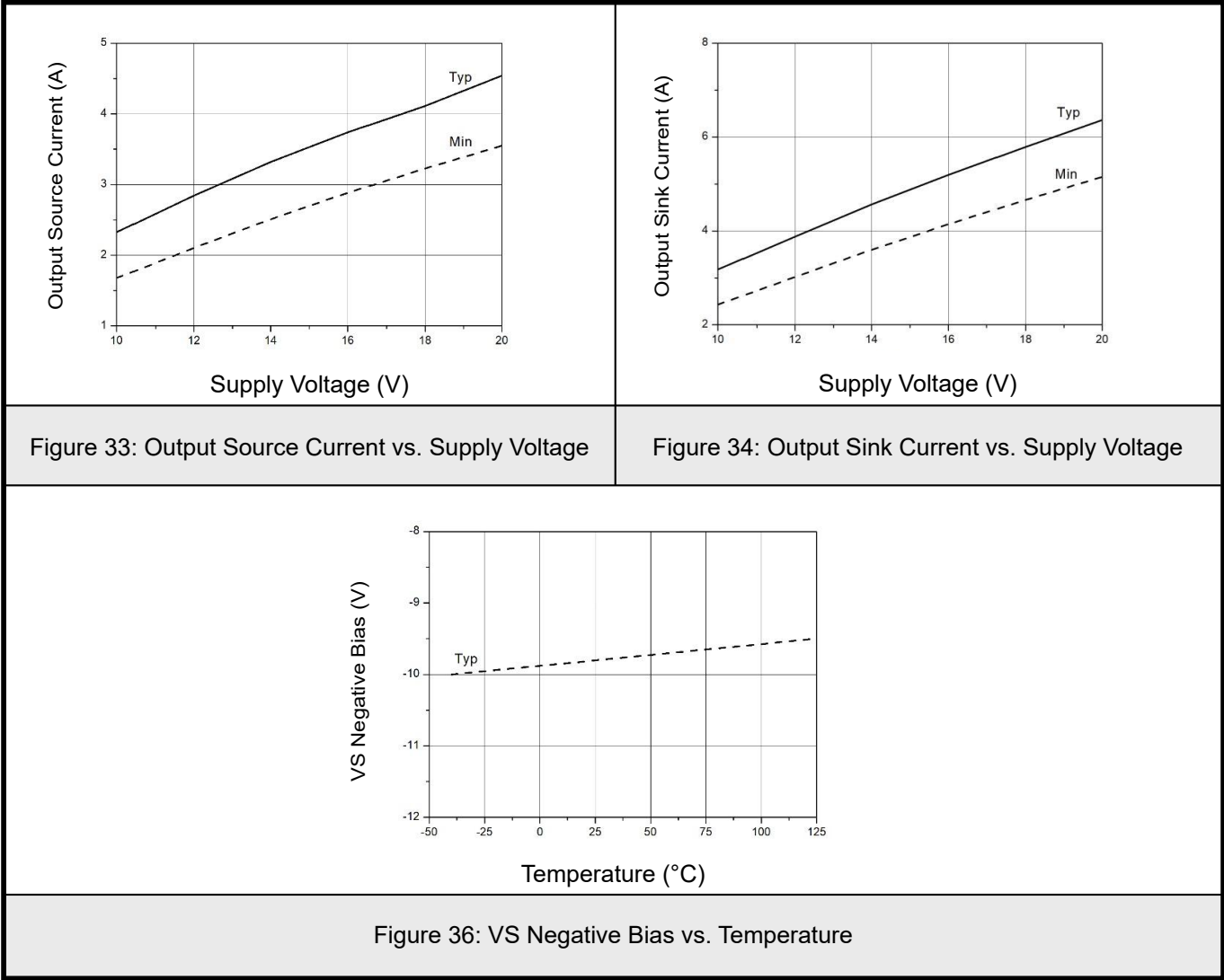


Figure 32: VCC and VBS Undervoltage Threshold (-) vs. Temperature



9.6 Typical Characteristic





10.Function Block Diagram

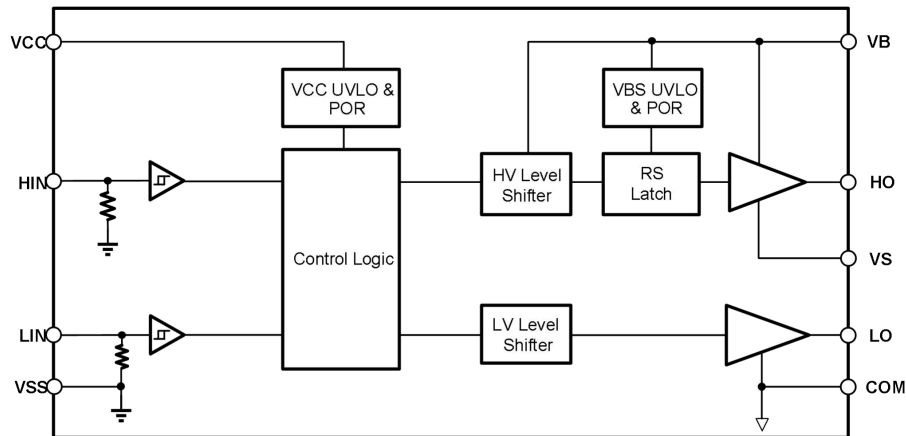


Figure 37. Function Block Diagram of UMW UCC27714DR

11.Application Message

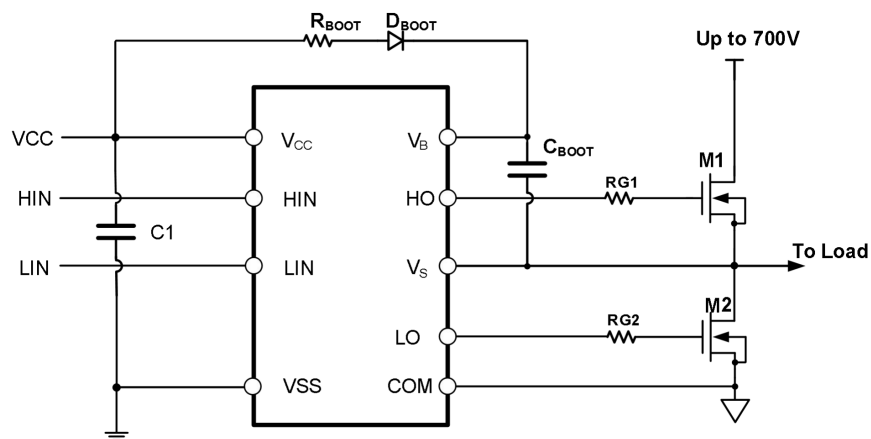
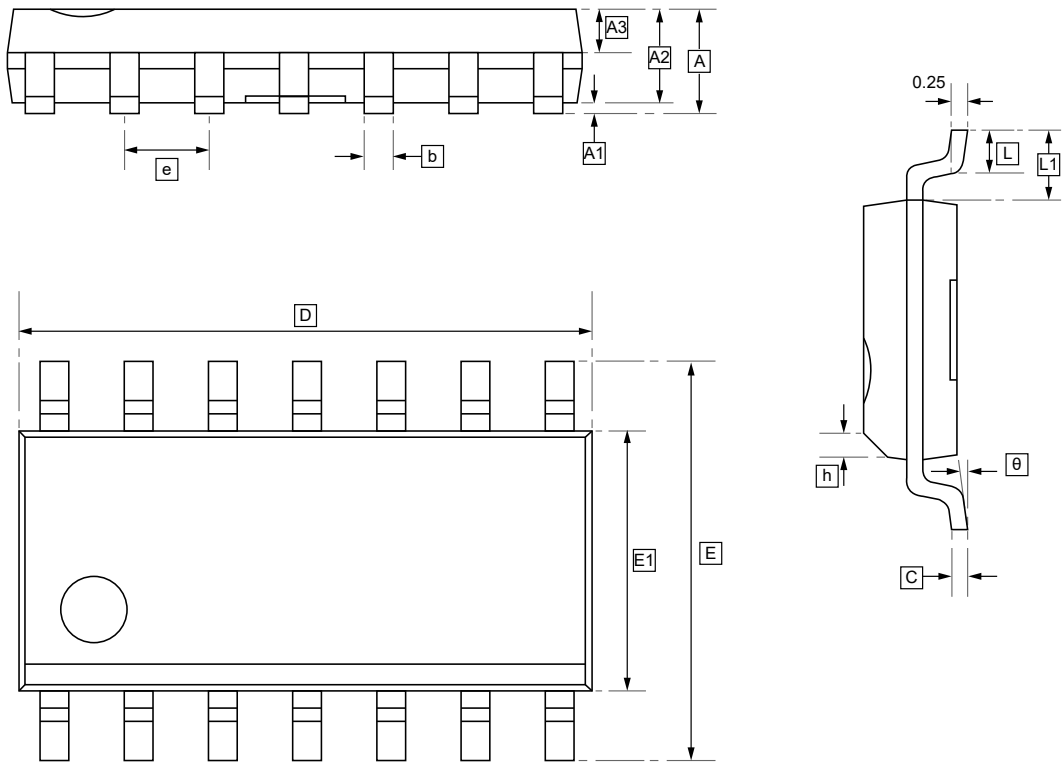


Figure 38. Typical application circuit of UMW UCC27714DR



12.SOP-14 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	C	D	E	E1	e	h	L
Min	-	0.05	1.35	0.65	0.203	0.17	8.45	5.80	3.80	1.24	0.25	0.40
Max	1.75	0.25	1.55	0.75	0.305	0.25	8.85	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°



13.Ordering information

UCC27714
UMW yyww

yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW UCC27714DR	SOP-14	2500	Tape and reel



14.Disclaimer

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