



LR9200

CMOS IC

LOW NOISE 200mA LDO REGULATOR

DESCRIPTION

The UTC **LR9200** is a typical LDO with the features of high output voltage accuracy, low supply current, low ON-resistance, and high ripple rejection.

During operation of the UTC **LR9200**, the dropout voltage is very low and the response of line transient and load transient are very well.

Internally, there're many functions of UTC **LR9200** which can be seen in the block figure. There are a voltage reference unit, an error amplifier, resistor-net for voltage setting, a current limit circuit, and a chip enable circuit in each UTC **LR9200**.

The UTC **LR9200** can be used as an ideal of the power supply for hand-held communication equipment, such as: power source for portable communication equipment, power source for electrical appliances, for example, cameras, VCRs and camcorders and power source for battery-powered equipment.

FEATURES

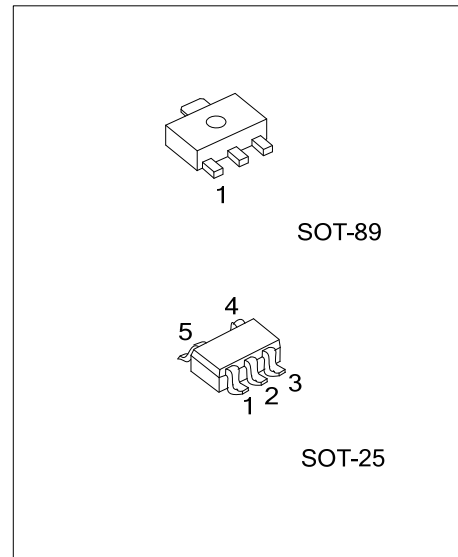
- * Ultra Supply Current: 20 μ A (Typ.)
- * Standby Mode: 0.1 μ A (Typ.)
- * Very Low Dropout Voltage: 0.13V (Typ.)
@I_{OUT}=150mA, V_{OUT}=2.85V
- * Ripple Rejection: 75dB (Typ.)
@f=1kHz, V_{OUT}=2.85V
- * Temperature-Drift Coefficient of Output Voltage: \pm 30ppm/ $^{\circ}$ C (Typ.)
- * Well Line Regulation: 0.02%/V (Typ.)
- * Output Voltage Accuracy: \pm 0.8% (Typ.)
- * Internal Fold Back Protection Circuit: 40mA (Typ.) @ short mode
- * C_{IN}=C_{OUT}=1 μ F or more (Ceramic capacitors) are recommended to be used with this IC

ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
LR9200L-xx-AF5-R	LR9200G-xx-AF5-R	SOT-25	V _{IN}	G	CE	NC	O	Tape Reel
LR9200L-xx-AB3-C-R	LR9200G-xx-AB3-C-R	SOT-89	G	I	O	-	-	Tape Reel

Note: xx: Output Voltage, refer to Marking Information.

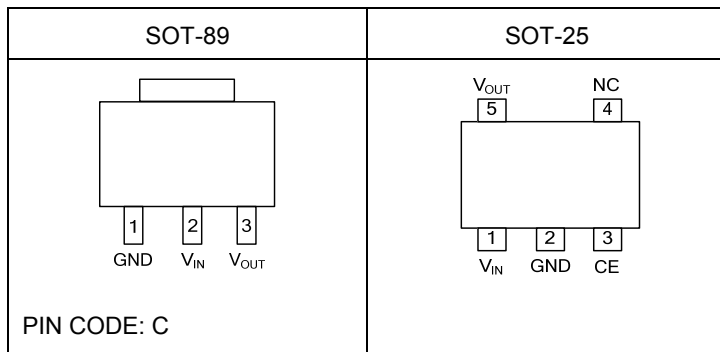
<p>LR9200L-xx-AF5-x-R</p>	<ul style="list-style-type: none"> (1) R: Tape Reel (2) refer to Pin Assignment (3) AF5: SOT-25, AB3: SOT-89 (4) xx: Refer to Marking Information (5) L: Lead Free, G: Halogen Free
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MARKING

PACKAGE	VOLTAGE CODE	MARKING
SOT-89	12: 1.2V 15: 1.5V 16: 1.6V 18: 1.8V 20: 2.0V	<p>Date Code ←</p> <p>→ Voltage Code</p> <p>→ Pin Code</p> <p>→ L: Lead Free</p> <p>→ G: Halogen Free</p> <p>1 2 3</p>
SOT-25	25: 2.5V 2J: 2.85V 30: 3.0V 33: 3.3V 50: 5.0V	<p>Voltage Code ←</p> <p>→ R0XX</p> <p>→ L: Lead Free</p> <p>→ G: Halogen Free</p> <p>5 4</p> <p>1 2 3</p>

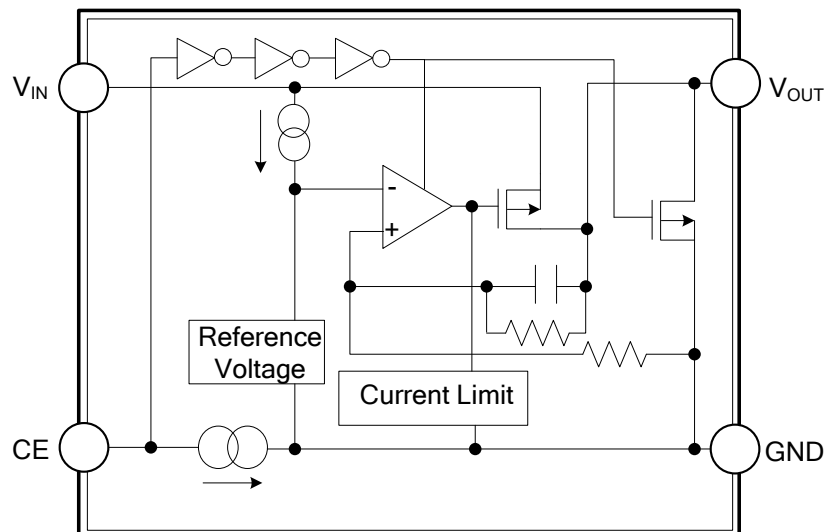
PIN CONFIGURATION



PIN DESCRIPTIONS

PIN NAME	DESCRIPTION
V_{IN}	Input Pin
GND	Ground Pin
CE	Chip Enable Pin. Active when this Pin is high.
NC	No Connection
V_{OUT}	Output Pin

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	9	V
Input Voltage(CE Pin)	V_{CE}	8.5	V
Output Voltage	V_{OUT}	-0.3~ $V_{IN}+0.3$	V
Output Current	I_{OUT}	300	mA
Power Dissipation	SOT-25	P_D	mW
	SOT-89		
Junction Temperature	T_J	+125	°C
Operating Temperature	T_{OPR}	-40~+85	°C
Storage Temperature	T_{STG}	-55~+125	°C

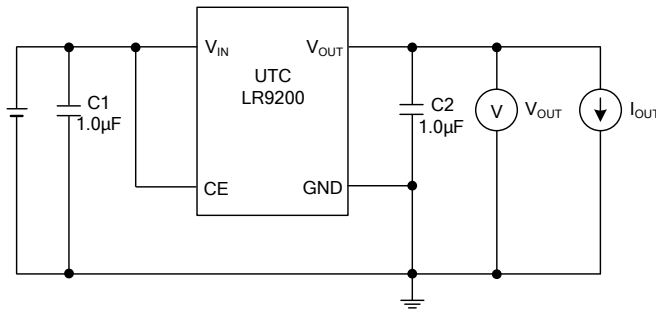
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.
 Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

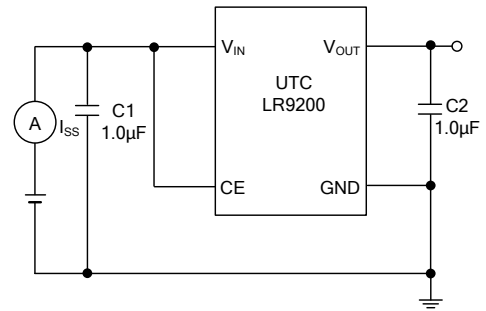
($T_A=25^\circ\text{C}$, $V_{IN}=\text{Set } V_{OUT}+1\text{V}$, $I_{OUT}=1\text{mA}$, $C_I=C_O=1\mu\text{F}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$V_{IN} = \text{Set } V_{OUT}+1\text{V}$	$V_{OUT} > 2.0\text{V}$	$\times 0.992$	$\times 1.008$	V
			$V_{OUT} \leq 2.0\text{V}$	-16	+16	mV
Input Voltage	V_{IN}				7.5	V
Load Regulation	ΔV_{OUT}	$1\text{mA} \leq I_{OUT} \leq 150\text{mA}$		20	40	mV
Output Current	I_{OUT}		200			mA
Supply Current	I_{SS}	$I_{OUT}=0\text{A}$		20	40	μA
Supply Current (Standby)	I_{ST-BY}	$V_{CE}=0\text{V}$		0.1	2	μA
Short Current Limit	I_{LIMIT}	$V_{OUT}=0\text{V}$		40		mA
CE Pull-down Current	I_{PD}			0.3		μA
CE Input Voltage	High	V_{CEH}	1.5			V
	Low	V_{CEL}			0.3	V
Output Noise	eN	$B_W=10\text{Hz to } 100\text{kHz}$, $I_{OUT}=30\text{mA}$		30		μVrms
Ripple Rejection	RR	$f=1\text{kHz}$, Ripple 0.2V_{P-P} $V_{IN}=\text{Set } V_{OUT}+1\text{V}$, $I_{OUT}=30\text{mA}$ (In case that $V_{OUT}=2.0\text{V}$, $V_{IN}=3\text{V}$)		75		dB
Dropout Voltage	V_D	$I_{OUT}=150\text{mA}$	$1.2\text{V} \leq V_{OUT} < 1.5\text{V}$	0.40	0.50	V
			$1.5\text{V} \leq V_{OUT} < 1.7\text{V}$	0.24	0.38	
			$1.7\text{V} \leq V_{OUT} < 2.0\text{V}$	0.21	0.34	
			$2.0\text{V} \leq V_{OUT} < 2.5\text{V}$	0.17	0.30	
			$2.5\text{V} \leq V_{OUT} < 2.8\text{V}$	0.14	0.25	
			$2.8\text{V} \leq V_{OUT} \leq 5.0\text{V}$	0.13	0.23	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	$1.2\text{V} \leq V_{OUT} \leq 4.0\text{V}$, $V_{SET}+0.5\text{V} \leq V_{IN} \leq 5\text{V}$		0.02	0.10	%V
		$4.0\text{V} < V_{OUT} \leq 5.0\text{V}$, $V_{SET}+0.5\text{V} \leq V_{IN} \leq 6.5\text{V}$				
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T}$	$-40^\circ\text{C} \leq T_{OPR} \leq 85^\circ\text{C}$		± 30		ppm/°C
Low Output Nch Tr. ON Resistance	R_{LOW}	$V_{IN}=4.0$, $V_{CE}=0\text{V}$		70		Ω

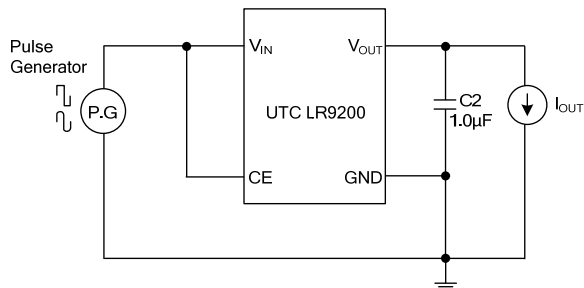
■ TEST CIRCUIT



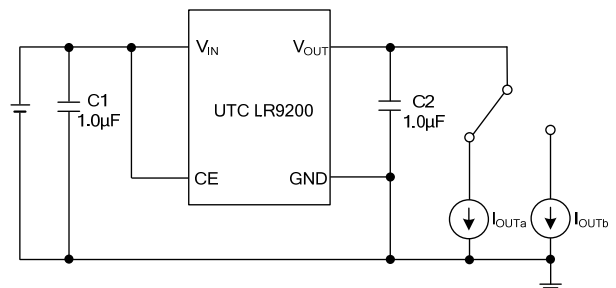
Basic Test Circuit



Test Circuit for Supply Current

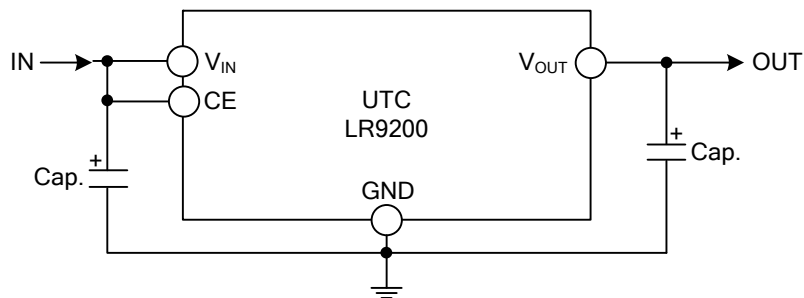


Test Circuit for Ripple Rejection

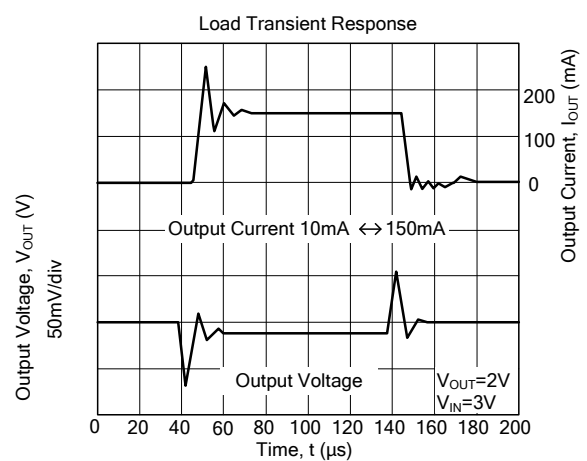
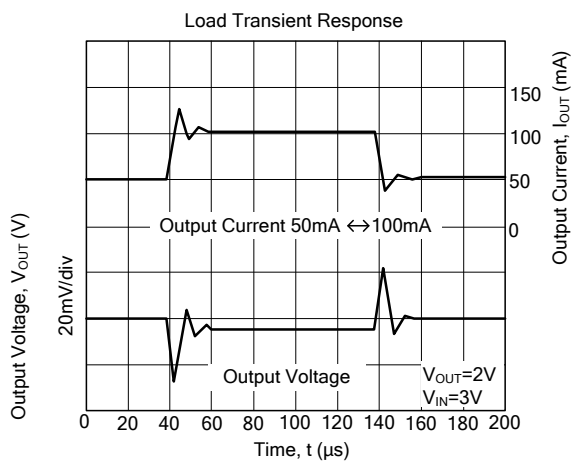
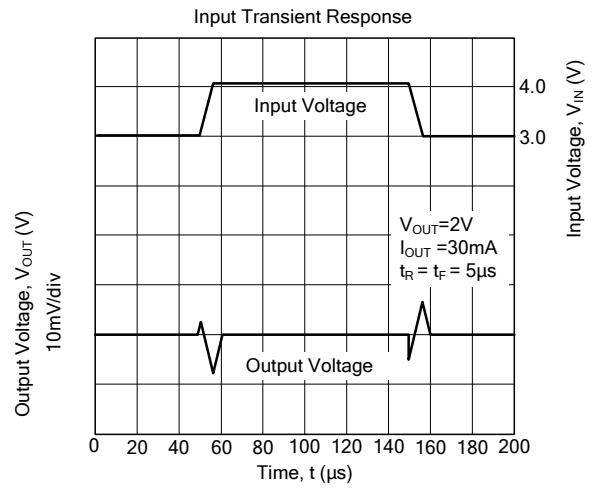
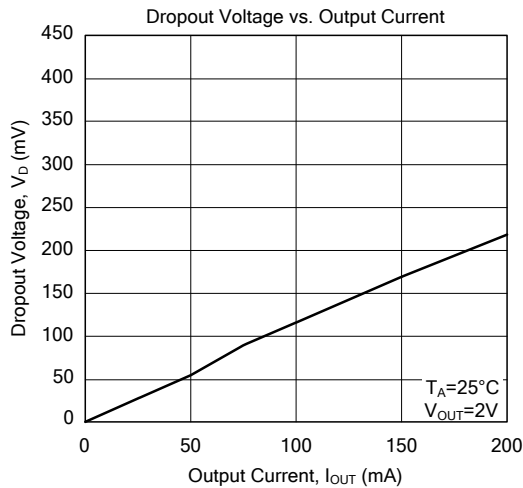
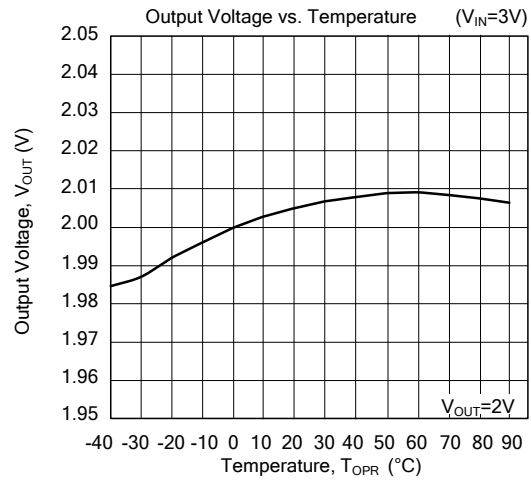
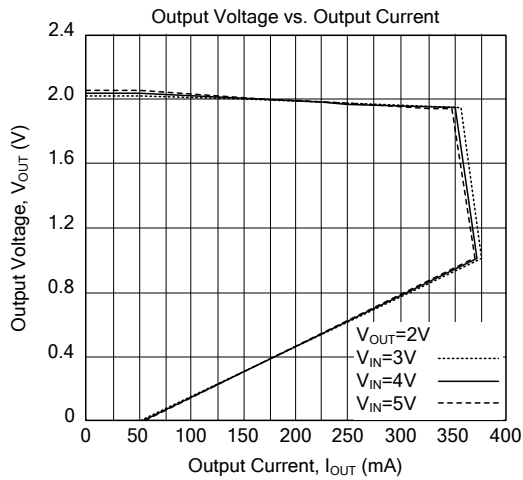


Test Circuit for Load Transient Response

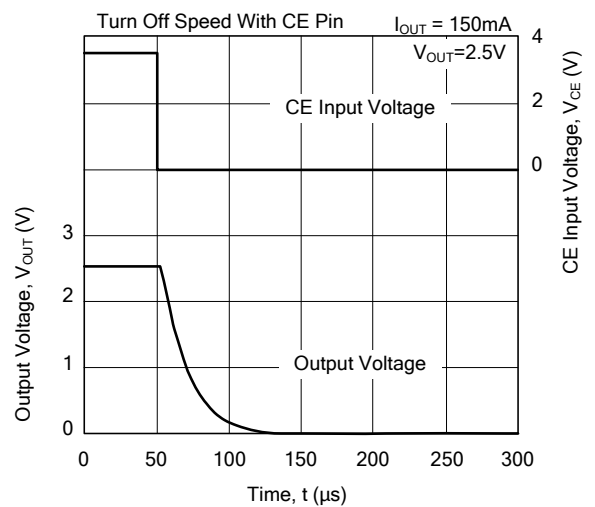
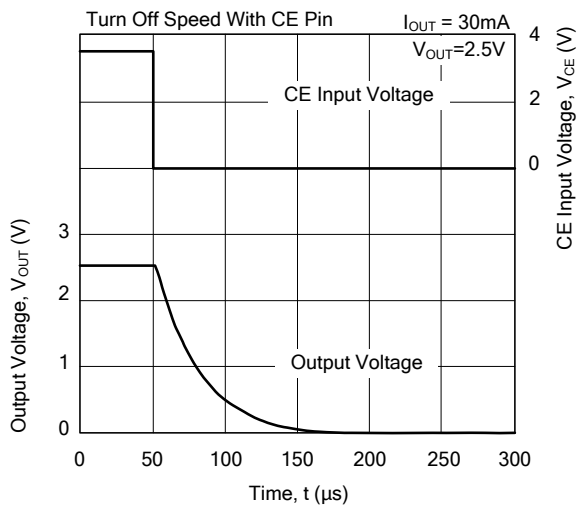
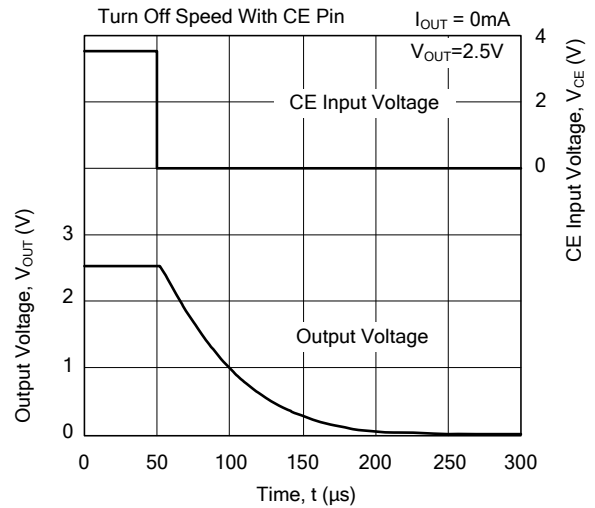
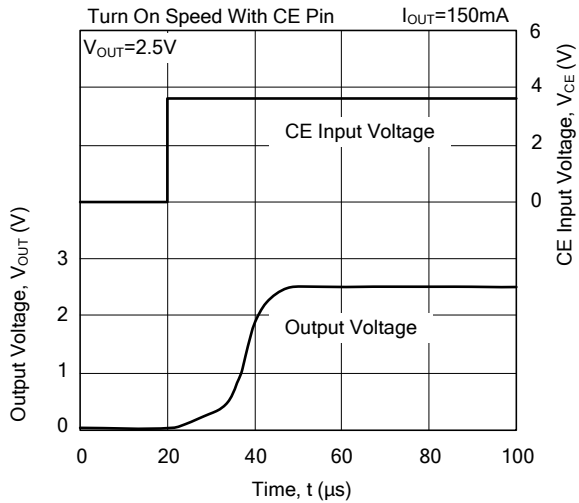
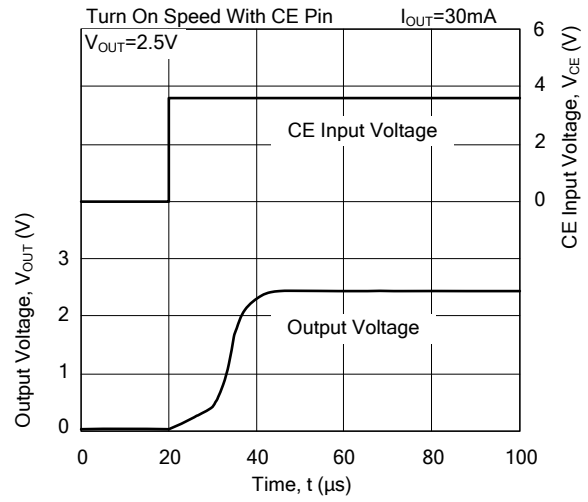
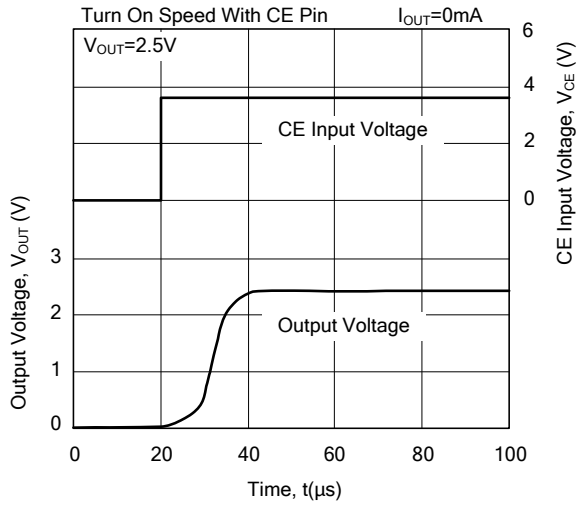
■ TYPICAL APPLICATION CIRCUIT



■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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