



## UR5515

CMOS IC

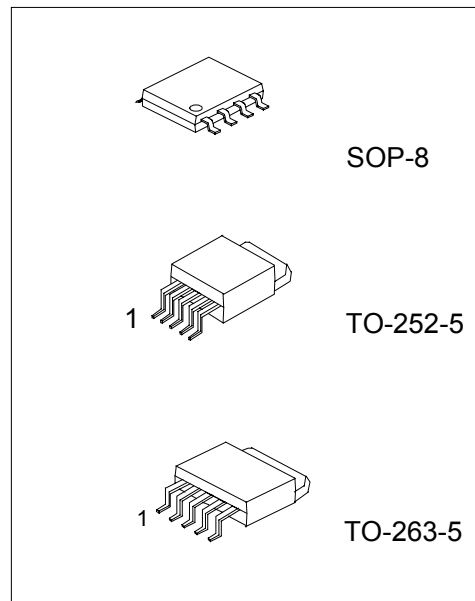
### 1.5A/3A BUS TERMINATION REGULATOR

#### DESCRIPTION

The UTC **UR5515** is a linear bus termination regulator and designed to convert voltage supplies ranging from 1.6V~6.0V into a desired output voltage, which adjusted by two external voltage divider resistors. The device can both source and sink up to 1.5A/3A of current while regulating an output voltage to within 2% (DDR-I) and 3% (DDR-II) or less.

The UTC **UR5515** is capable of use in conjunction with series termination resistors to provide an excellent voltage source for active termination schemes of high speed transmission lines as those seen in high speed memory buses and distributed backplane designs.

The voltage output of the regulator can be used as a termination voltage for DDR SDRAM.



\*Pb-free plating product number: UR5515L

#### FEATURES

- \* Support Both DDR-I (1.25 V<sub>TT</sub>) and DDR-II (0.9 V<sub>TT</sub>) Requirements
- \* Capable of Sourcing and Sinking Current 1.5A/3A
- \* Current-limiting Protection and Thermal Shutdown Protection
- \* Integrated Power MOSFETs
- \* Generates Termination Voltages for SSTL-2
- \* High Accuracy Output Voltage at Full-Load
- \* Adjustable output voltage by External Resistors
- \* Minimum External Components
- \* Shutdown for Standby or Suspend Mode Operation with High-impedance Output.

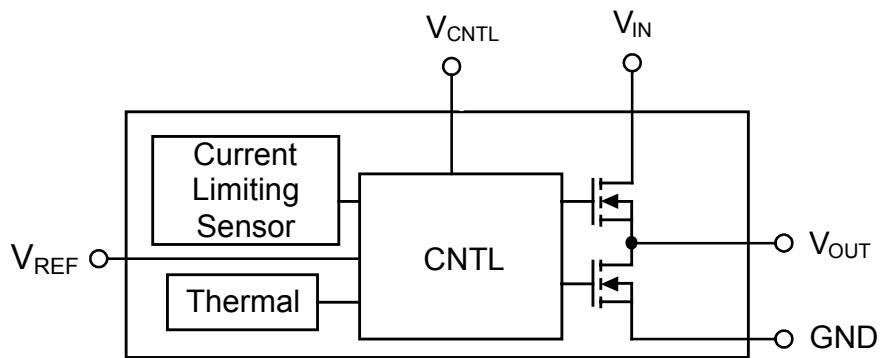
#### ORDERING INFORMATION

Order Number		Package	Packing
Normal	Lead Free Plating		
UR5515-S08-R	UR5515L-S08-R	SOP-8	Tape Reel
UR5515-S08-T	UR5515L-S08-T	SOP-8	Tube
UR5515-TN5-R	UR5515L-TN5-R	TO-252-5	Tape Reel
UR5515-TN5-T	UR5515L-TN5-T	TO-252-5	Tube
UR5515-TQ5-R	UR5515L-TQ5-R	TO-263-5	Tape Reel
UR5515-TQ5-T	UR5515L-TQ5-T	TO-263-5	Tube

■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
SOP-8	TO-252-5/TO-263-5		
1	1	$V_{IN}$	Input Voltage
2	2	GND	Ground
5,6,7,8	3	$V_{CNTL}$	Gate Drive Voltage
3	4	$V_{REF}$	Reference Voltage Input and Chip Enable
4	5	$V_{OUT}$	Output Voltage

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	7	V
Power Dissipation	$P_D$	Internally Limited	W
Junction Temperature	$T_J$	125	
Storage Temperature Range	$T_{STG}$	-40 ~ 150	

Note:1.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.

2.The device is guaranteed to meet performance specification within 0 ~70 operating temperature range and assured by design from -20 ~85 .

### ■ ELECTRICAL CHARACTERISTICS

( $T_a = 25$  , unless otherwise specified:  $V_{IN} = 2.5V$ ,  $V_{CNTL} = 3.3V$ ,  $V_{REF} = 1.25V$ ,  $C_{OUT} = 10\mu F$ (Ceramic).)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Input Voltage Range(Note 1)	$V_{IN}$	No Load,(Note 2)	DDR-I	1.6	2.5		V
			DDR-II		1.8		
	$V_{CNTL}$		DDR-I		3.3	6	
			DDR-II		3.3	6	
Output Offset Voltage	$V_{OS}$	$I_{OUT} = 0A$ , Fig. 1 (Note 3)	-20	0	20	mV	
Operating Current of $V_{CNTL}$	$I_{CNTL}$	No Load		6.5	10	mA	
Load Regulation	$V_{LOAD}$	$I_L: 0 \sim 1.5A$ , Fig. 1	DDR-I		0.8	2	%
			DDR-II		1.2	3	
		$I_L: 0 \sim -1.5A$ , Fig. 1	DDR-I		0.8	2	
			DDR-II		1.2	3	
Current In Shutdown Mode	$I_{SHDN}$	$V_{REF} < 0.2V$ , $R_L = 180\Omega$ , Fig. 2		50	90	$\mu A$	
<b>Short Circuit Protection</b>							
Current Limit	UR5515	$I_{LIMIT}$	Fig 3, 4	2.1			A
	UR5515A			3.0			
<b>Over Temperature Protection</b>							
Thermal Shutdown Temperature	$T_{SD}$	$3.3V \leq V_{CNTL} \leq 5V$	125	150			
Thermal Shutdown Hysteresis				50			
<b>Shutdown Function</b>							
Shutdown Threshold Voltage	$V_{THD}$	Fig 5	0.2		0.8	V	

Note 1. For safely operate your system, the 3.3V rail have to be tied to  $V_{CNTL}$  rather than 5V rail

2. Keep  $V_{CNTL} \geq V_{IN}$  on operation power on and power off sequences.

3.  $V_{OS}$  offset is the voltage measurement defined as  $V_{OUT}$  subtracted from  $V_{REF}$ .

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Case	JC	SOP-8	35
		TO-252-5	8
		TO-263-5	4

## ■ TEST CIRCUITS

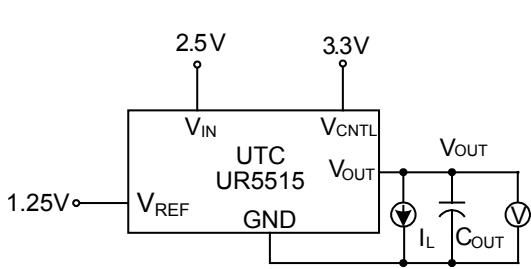


Fig1. Output Voltage Tolerance,  $V_{OUT}$

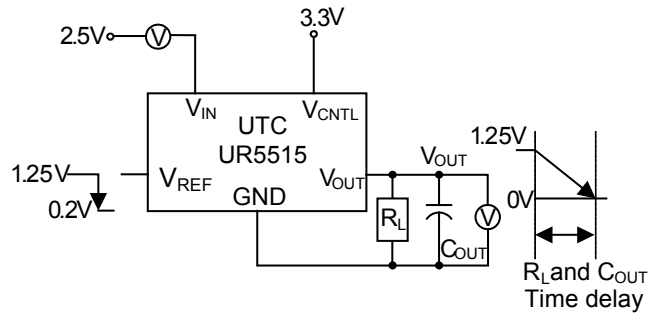


Fig2. Current in Shutdown Mode,  $I_{SHCLN}$

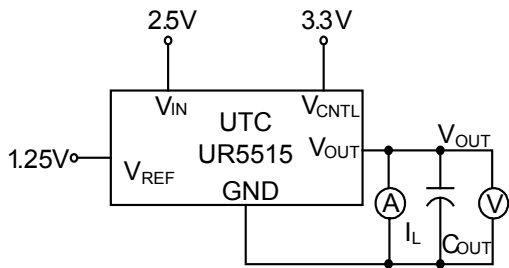


Fig3. Current Limit for High Side,  $I_{CLHIGH}$

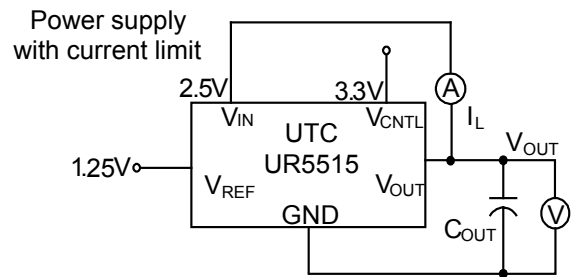


Fig4. Current Limit for Low Side,  $I_{CLLOW}$

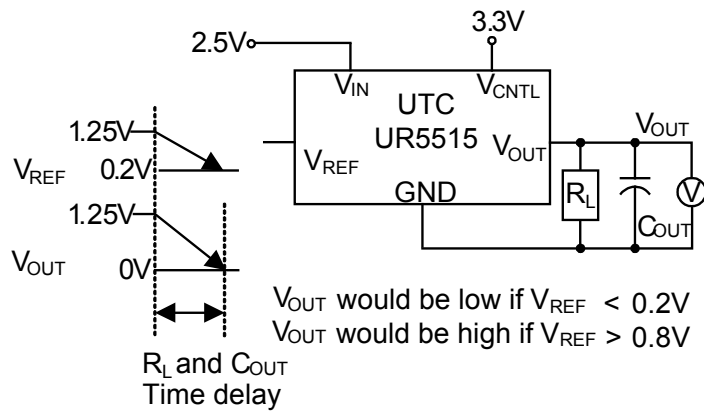
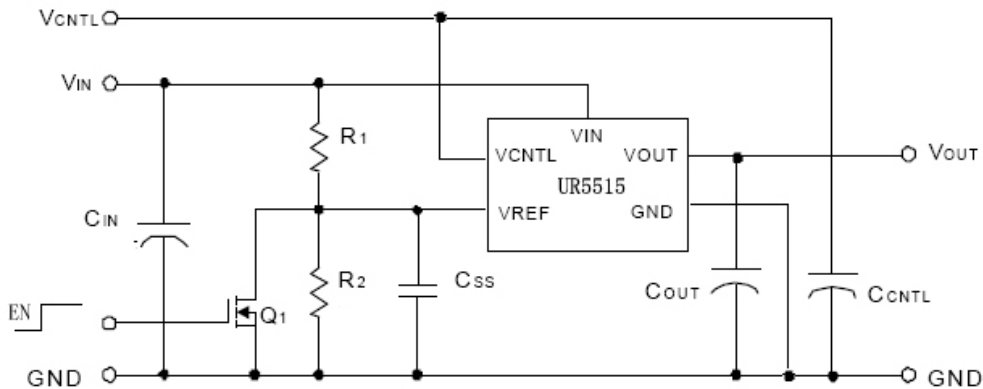


Fig5.  $V_{REF}$  Pin Shutdown Threshold Voltage

■ TYPICAL APPLICATION CIRCUIT



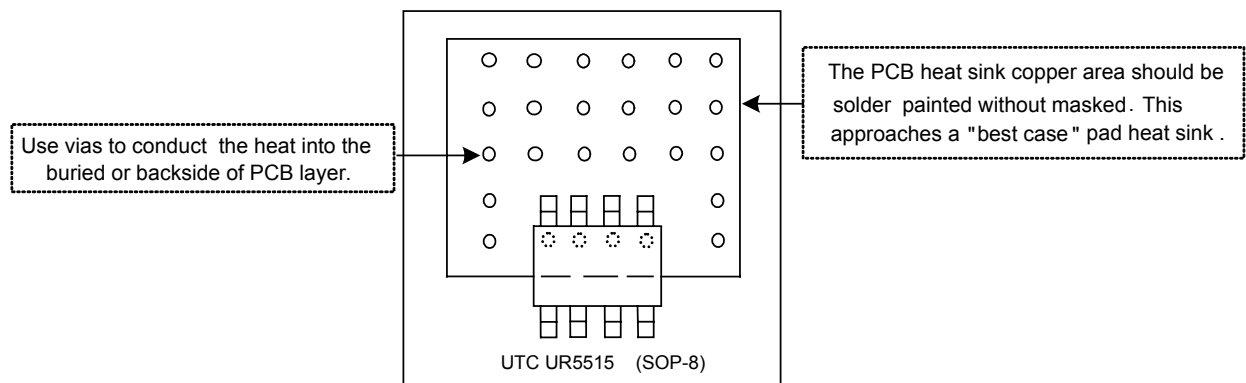
$R_1 = R_2 = 100K\Omega$

$C_{OUT(min)} = 10\mu F(\text{Ceramic}) + 1000\mu F$  under the worst case testing condition

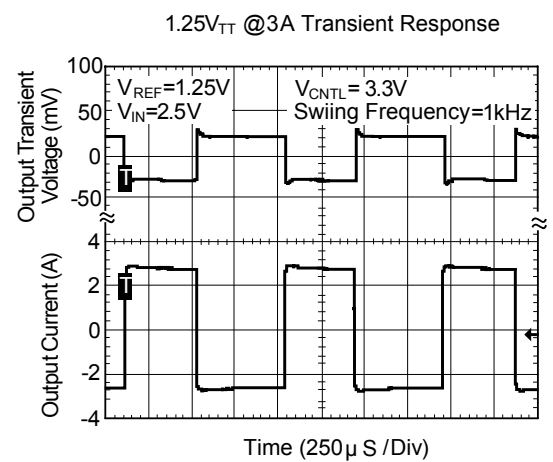
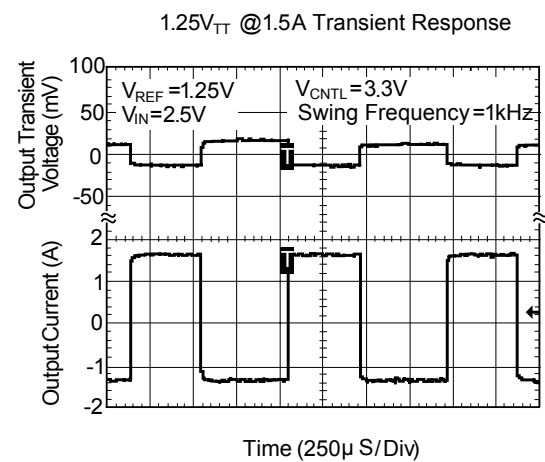
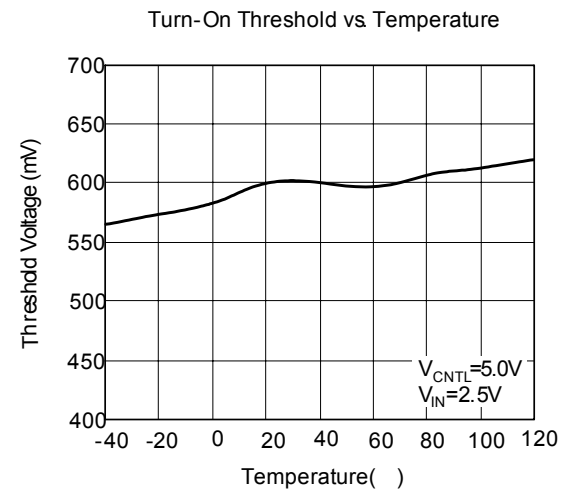
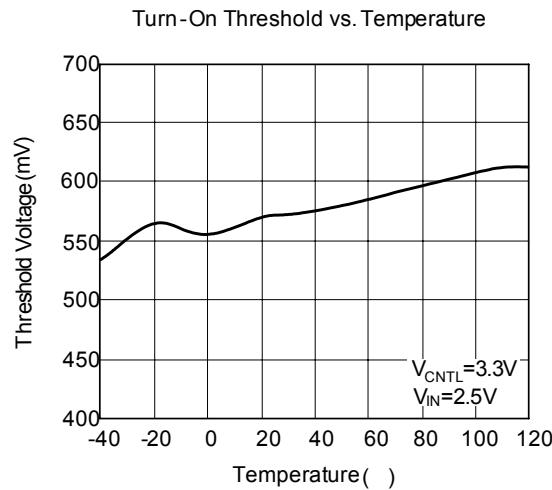
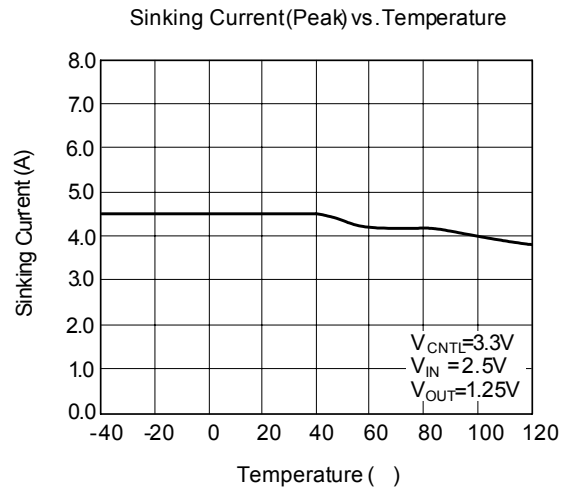
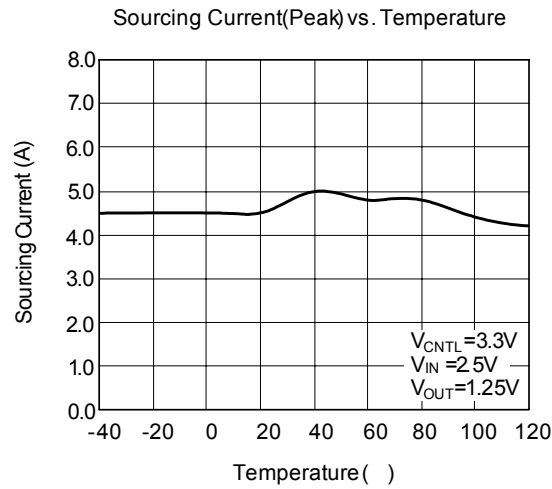
$C_{SS} = 1\mu F, C_{IN} = 40\mu F(\text{low ESR}), C_{CTRL} = 47\mu F$

■ APPLICATIONS INFORMATION

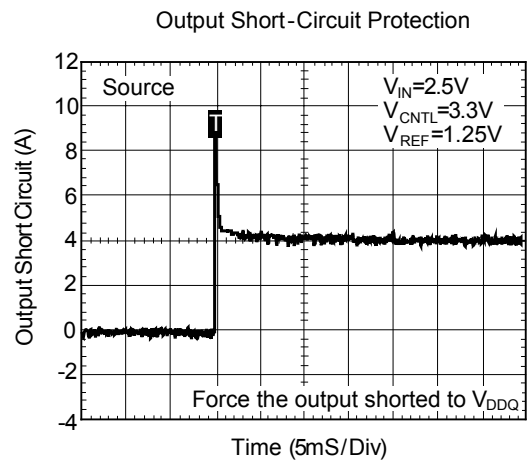
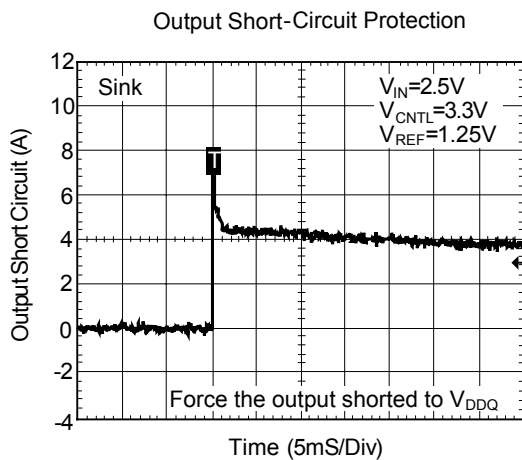
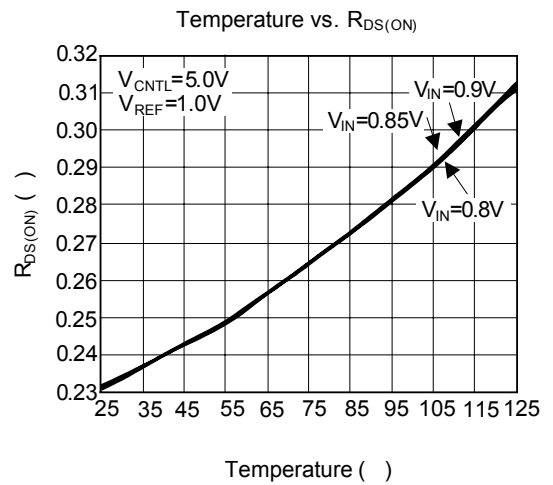
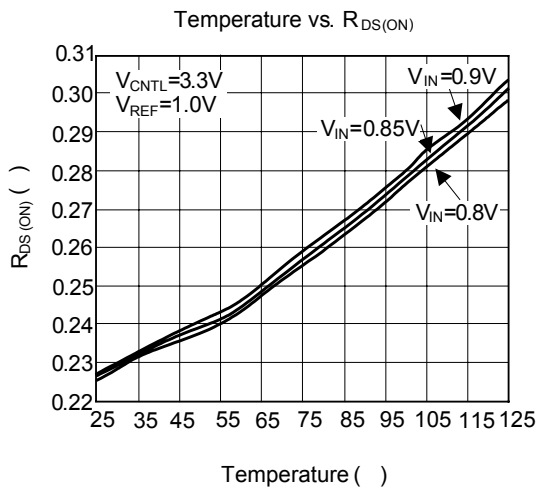
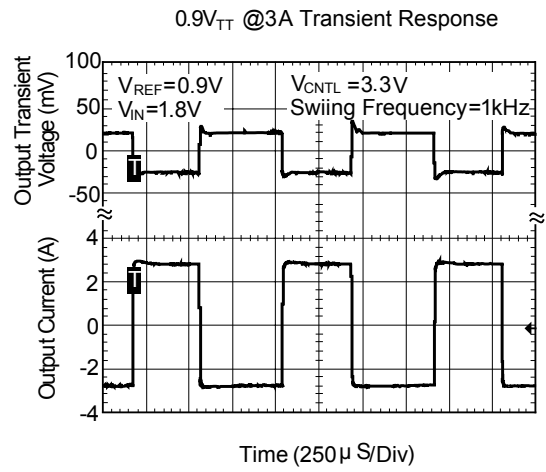
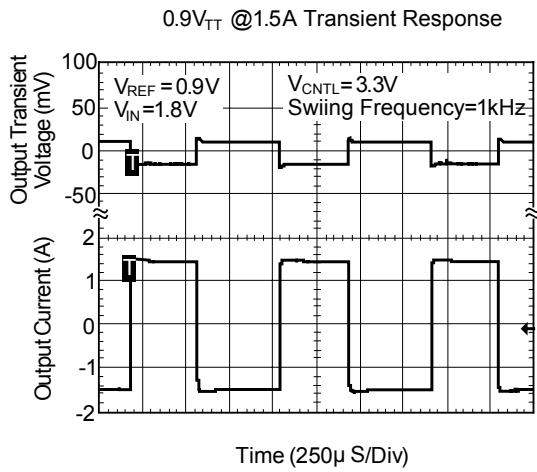
Please note the point of thermal shutdown will be degraded by around 20 while  $V_{CTRL}$  equal to 5V compared with 3.3V. It is highly recommended that to use the 3.3V rail acted as the  $V_{CTRL}$  in SOP-8 package. Nevertheless, this small footprint of PCB for plastic SOP-8 package is not enough to dissipate effectively the heat generated when operating at high current levels. In order to control die operating temperatures, the PCB layout should allow for maximum possible copper area at the four  $V_{CTRL}$  pins. Besides, an appropriate power plane heat sink must be used to prevent overstepping maximum junction temperature. The recommended SMT is as below.



■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (cont.)



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