

To our customers,

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HAT2099H

Silicon N Channel Power MOS FET
Power Switching

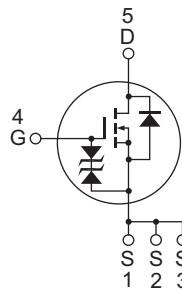
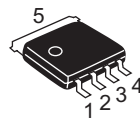
REJ03G1187-0500
(Previous: ADE-208-1432C)
Rev.5.00
Sep 07, 2005

Features

- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance
 $R_{DS(on)} = 2.9 \text{ m}\Omega$ typ. (at $V_{GS} = 10 \text{ V}$)

Outline

RENESAS Package code: PTZZ0005DA-A
(Package name: LPAK)



1, 2, 3 Source
4 Gate
5 Drain

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DS}	30	V
Gate to source voltage	V_{GS}	±20	V
Drain current	I_D	50	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	200	A
Body-drain diode reverse drain current	I_{DR}	50	A
Avalanche current	I_{AP} ^{Note 3}	5	A
Avalanche energy	E_{AR} ^{Note 3}	2.5	mJ
Channel dissipation	P_{ch} ^{Note 2}	30	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. Tc = 25 °C

3. Value at Tch = 25°C, Rg ≥ 50 Ω

Electrical Characteristics

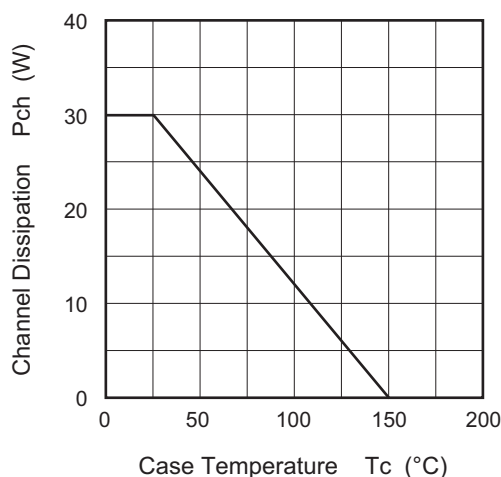
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100 \text{ } \mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	2.9	3.7	mΩ	$I_D = 25 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 4}
	$R_{DS(on)}$	—	5.0	7.3	mΩ	$I_D = 25 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note 4}
Forward transfer admittance	$ y_{fs} $	39	65	—	S	$I_D = 25 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 4}
Input capacitance	C_{iss}	—	4750	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	1180	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	650	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Q_g	—	75	—	nC	$V_{DD} = 10 \text{ V}$
Gate to source charge	Q_{gs}	—	16	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	14	—	nC	$I_D = 50 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	26	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 25 \text{ A}$
Rise time	t_r	—	60	—	ns	$V_{DD} \approx 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	85	—	ns	$R_L = 0.4 \text{ } \Omega$
Fall time	t_f	—	26	—	ns	$R_g = 4.7 \text{ } \Omega$
Body-drain diode forward voltage	V_{DF}	—	0.85	0.98	V	$I_F = 50 \text{ A}$, $V_{GS} = 0$ ^{Note 4}
Body-drain diode reverse recovery time	t_{rr}	—	60	—	ns	$I_F = 50 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu\text{s}$

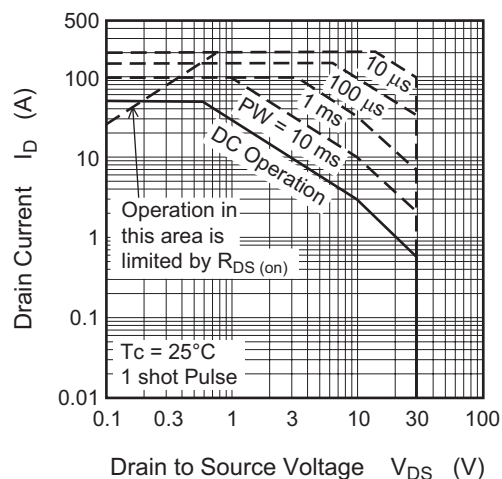
Note: 4. Pulse test

Main Characteristics

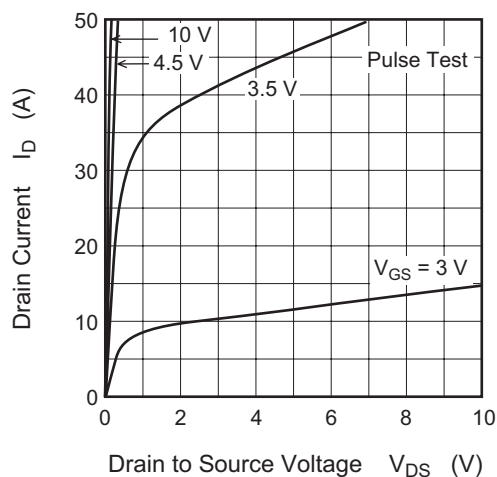
Power vs. Temperature Derating



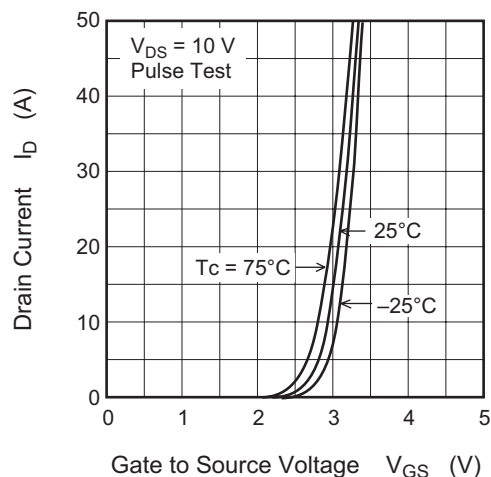
Maximum Safe Operation Area



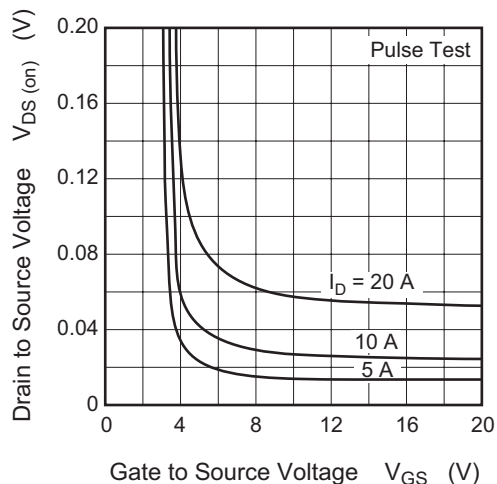
Typical Output Characteristics



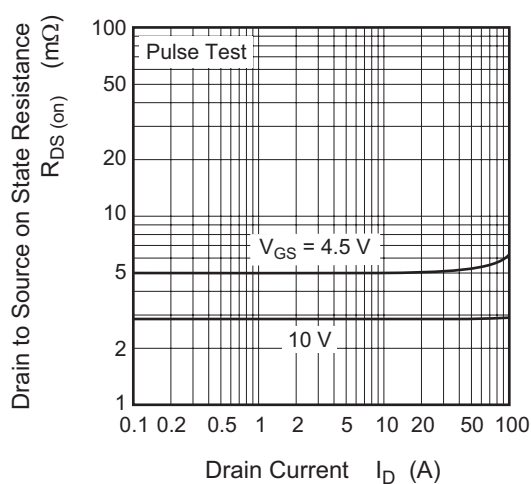
Typical Transfer Characteristics



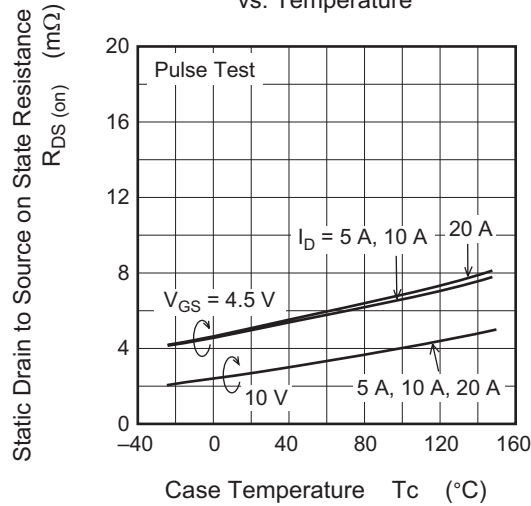
Drain to Source Saturation Voltage vs. Gate to Source Voltage



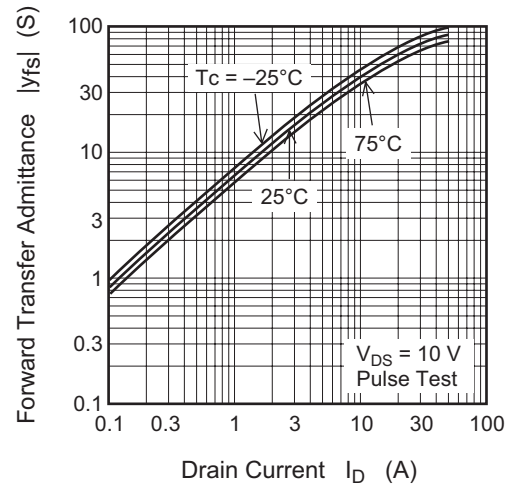
Static Drain to Source on State Resistance vs. Drain Current



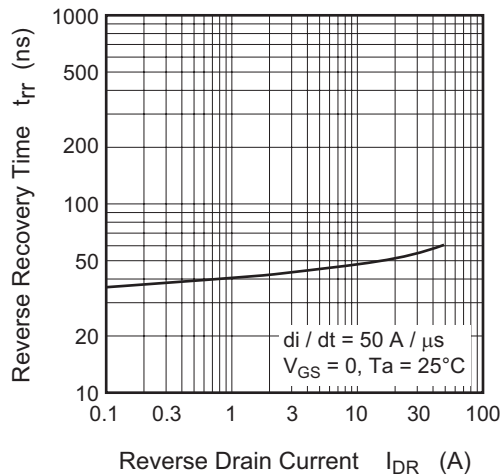
Static Drain to Source on State Resistance vs. Temperature



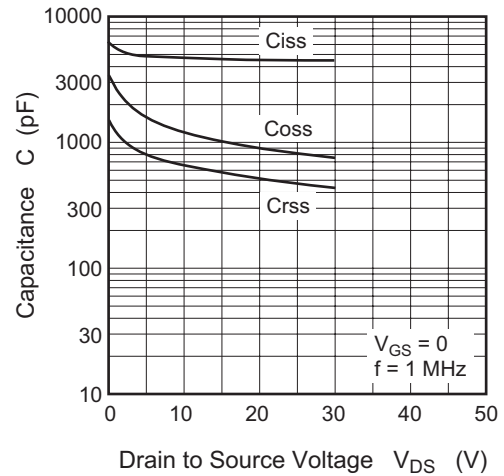
Forward Transfer Admittance vs. Drain Current



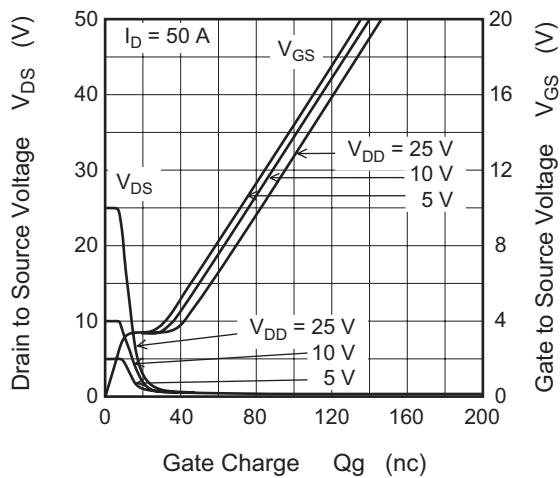
Body-Drain Diode Reverse Recovery Time



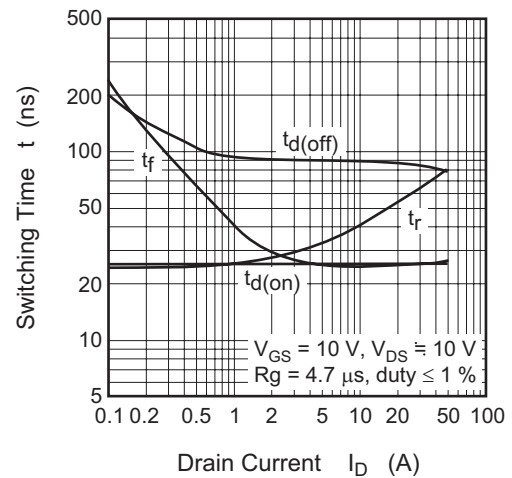
Typical Capacitance vs. Drain to Source Voltage

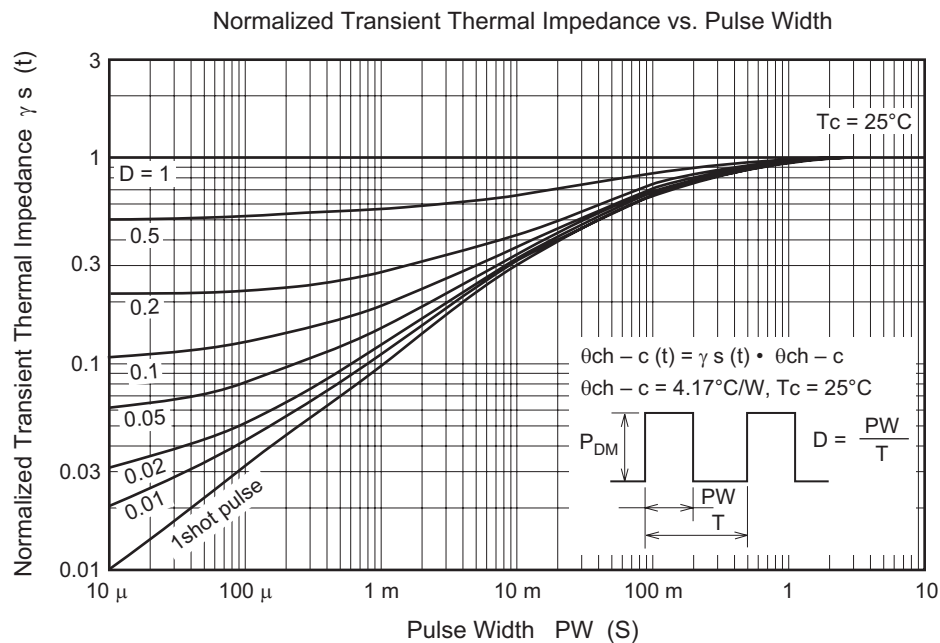
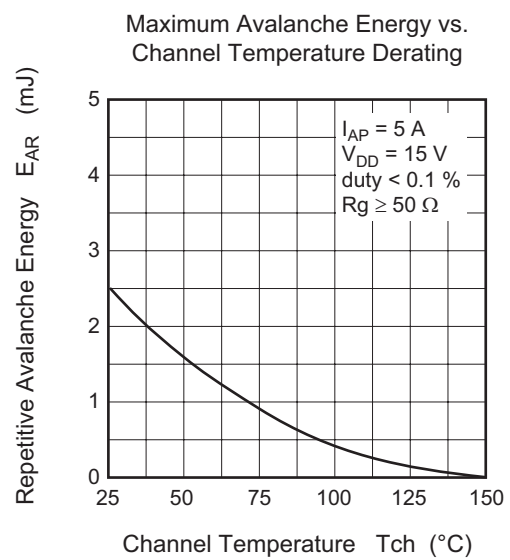
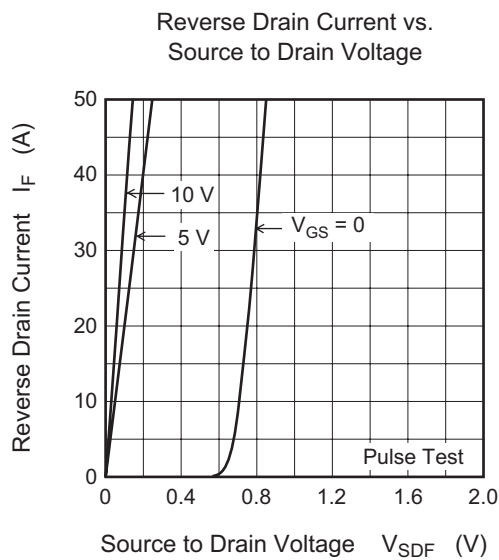


Dynamic Input Characteristics

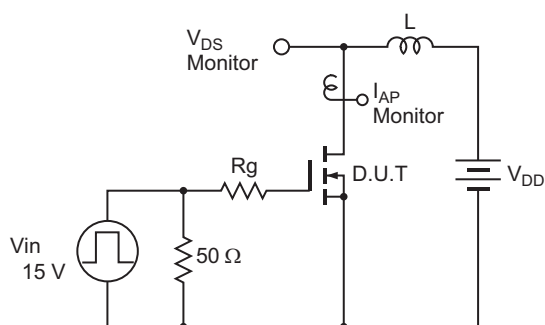


Switching Characteristics



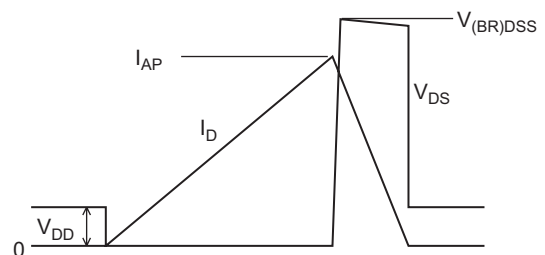


Avalanche Test Circuit

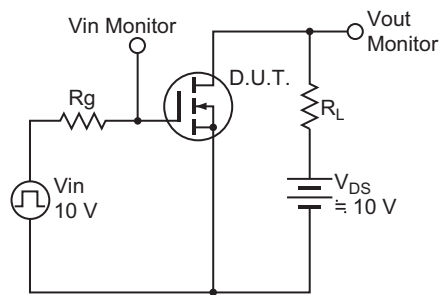


Avalanche Waveform

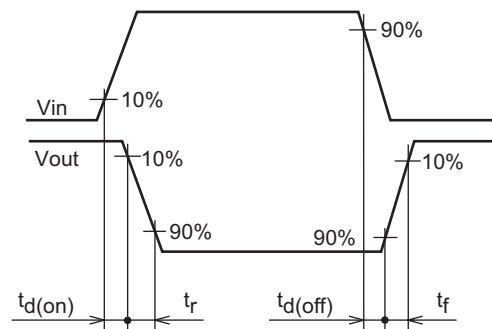
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



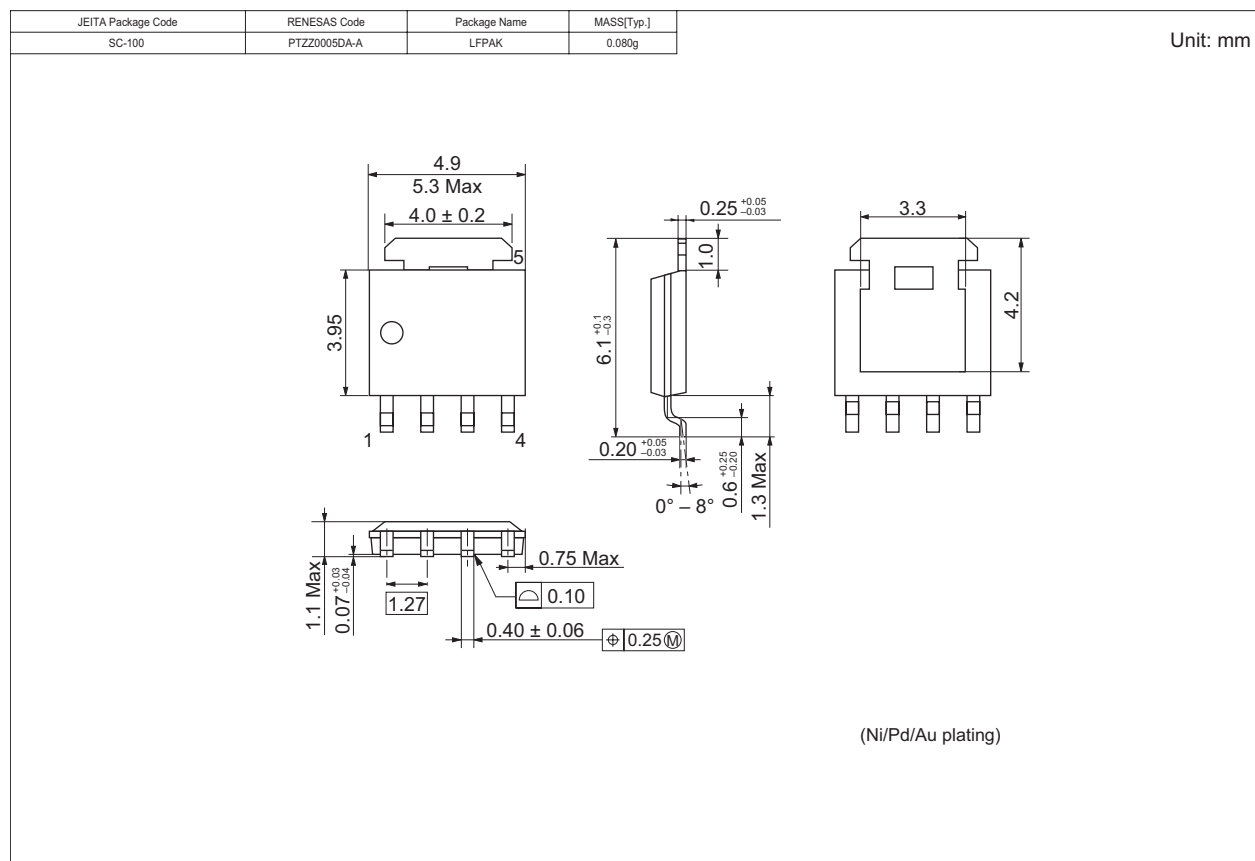
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT2099H-EL-E	2500 pcs	Taping

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