

Description:

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

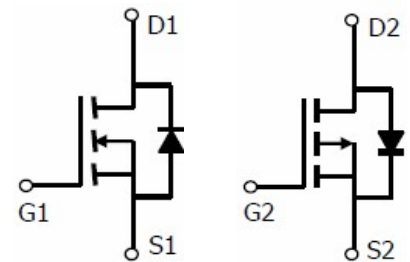
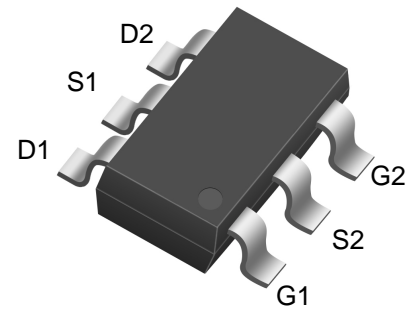
It can be used in a wide variety of applications.

Features:

N-Channel: $V_{DS}=40V, I_D=4.5A, R_{DS(on)} < 45m\Omega @ V_{GS}=10V$ (Typ: $35m\Omega$)

P-Channel: $V_{DS}=-40V, I_D=-3.5A, R_{DS(on)} < 80m\Omega @ V_{GS}=-10V$ (Typ: $65m\Omega$)

- 1) Low gate charge.
- 2) Green device available.
- 3) Advanced high cell density trench technology for ultra low $R_{DS(on)}$.
- 4) Excellent package for good heat dissipation.
- 5) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
DO4614U	4614U	SOT-23-6D	3000pcs/Reel

Absolute Maximum Ratings: ($T_A=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current- $T_A=25^\circ C^1$	4.5	-3.5	A
	Continuous Drain Current- $T_A=100^\circ C^1$	3.15	-2.4	
I_{DM}	Pulsed Drain Current ²	18	-14	A
P_D	Power Dissipation	1.0	1.0	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		$^\circ C$

Thermal Characteristics:

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	125	125	$^\circ C/W$

N-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=40V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	1	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ³	$V_{GS}=10V, I_D=3A$	---	35	45	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=2A$	---	45	60	$\text{m}\Omega$
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1\text{MHz}$	---	400	---	pF
C_{oss}	Output Capacitance		---	34.6	---	
C_{rss}	Reverse Transfer Capacitance		---	27	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DS}=20V, I_D=3A,$ $R_{ENG}=1\ \Omega, V_{GS}=4.5V$	---	13	---	ns
t_r	Rise Time		---	45	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	12.6	---	ns
t_f	Fall Time		---	10.5	---	ns
Q_g	Total Gate Charge		$V_{GS}=4.5V, V_{DS}=20V,$ $I_D=3A$	---	4	---
Q_{gs}	Gate-Source Charge	---		1.4	---	nC
Q_{gd}	Gate-Drain "Miller" Charge	---		1.1	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_{SD}=3A$	---	---	1.2	V
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	---	3.7	A
I_{SM}	Pulsed Drain Current		---	---	15	A
T_{rr}	Reverse Recovery Time	$I_F=3A, T_J=25^\circ\text{C}$	---	12	---	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=100A/\mu\text{s}$	---	6	---	nC

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

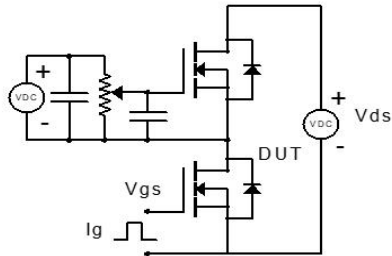


Figure 1: Gate Charge Test Circuit & Waveform

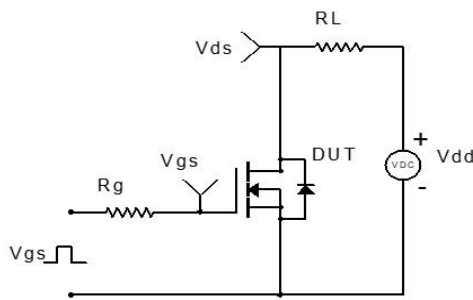


Figure 2: Resistive Switching Test Circuit & Waveform

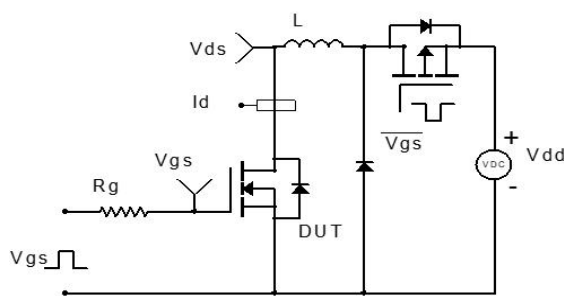


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

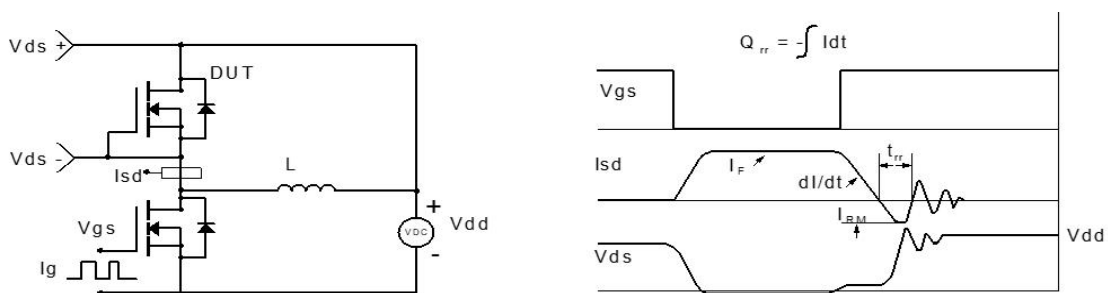


Figure 4: Diode Recovery Test Circuit & Waveform

P-Channel Electrical Characteristics: ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-40	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-40V$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-1.2	-1.6	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ³	$V_{GS}=-10V, I_D=-5A$	---	65	80	$\text{m}\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	---	75	90	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$	---	400	---	pF
C_{oss}	Output Capacitance		---	49	---	
C_{rss}	Reverse Transfer Capacitance		---	47.5	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-20V, I_D=-5A$ $V_{GS}=-10V, R_{GEN}=3\ \Omega$	---	14.7	---	ns
t_r	Rise Time		---	33.6	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	47	---	ns
t_f	Fall Time		---	42	---	ns
Q_g	Total Gate Charge		---	4	---	nC
Q_{gs}	Gate-Source Charge	$V_{GS}=-10V, V_{DS}=-20V,$ $I_D=-5A$	---	2.3	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	2.2	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	$V_D=V_G=0V$	---	---	-1.2	A
I_{SM}	Pulsed Drain to Source Diode		---	---	-2.9	---
V_{SD}	Source-Drain Diode Forward Voltage	$V_{GS}=0V, I_S=-3A$	---	---	-11.6	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Test Circuit

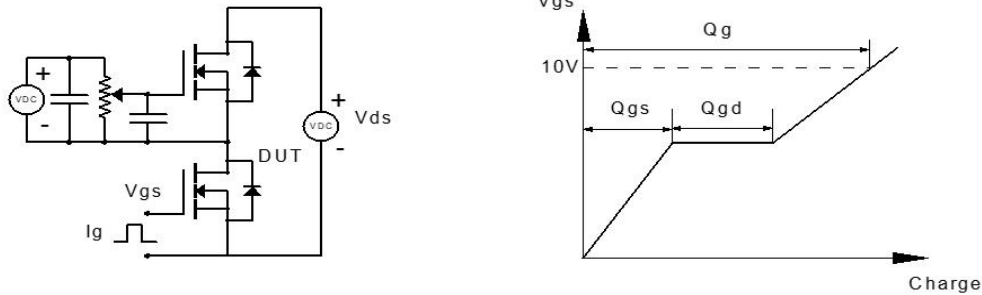


Figure 1: Gate Charge Test Circuit & Waveform

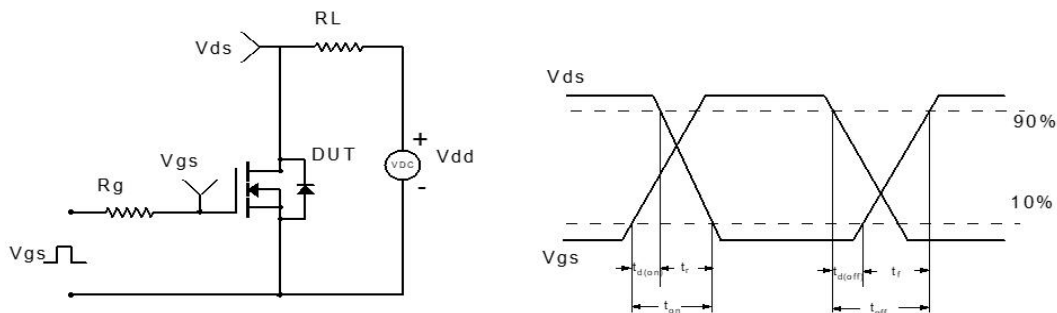


Figure 2: Resistive Switching Test Circuit & Waveform

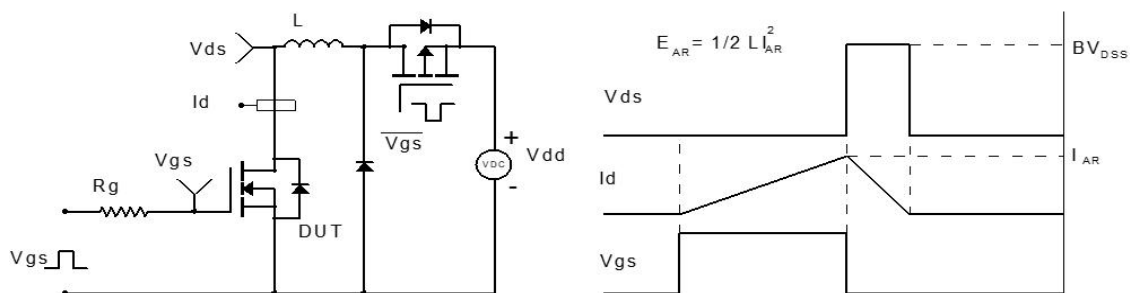


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

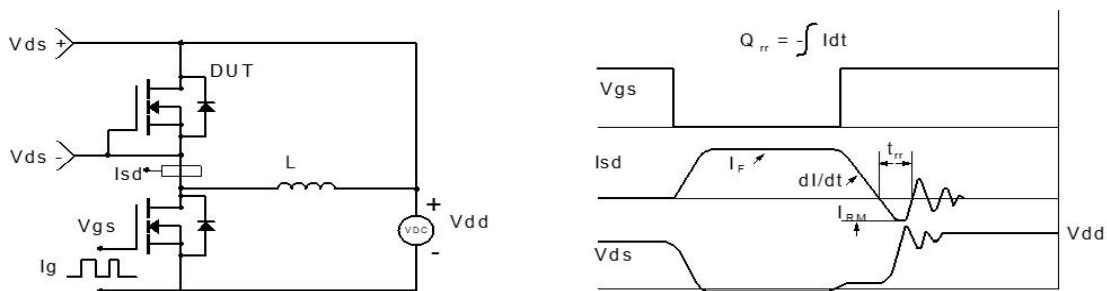
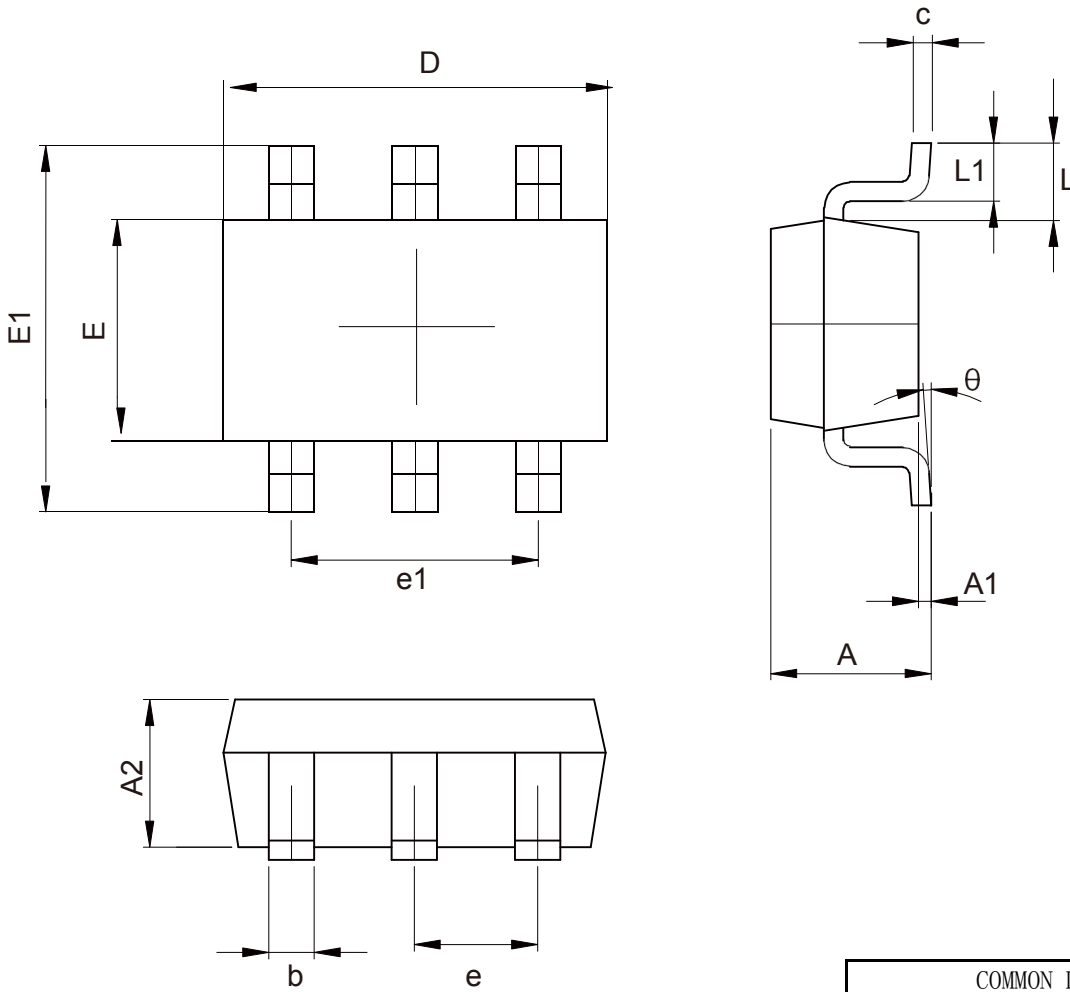


Figure 4: Diode Recovery Test Circuit & Waveform

SOT-23-6D Package Outline Data

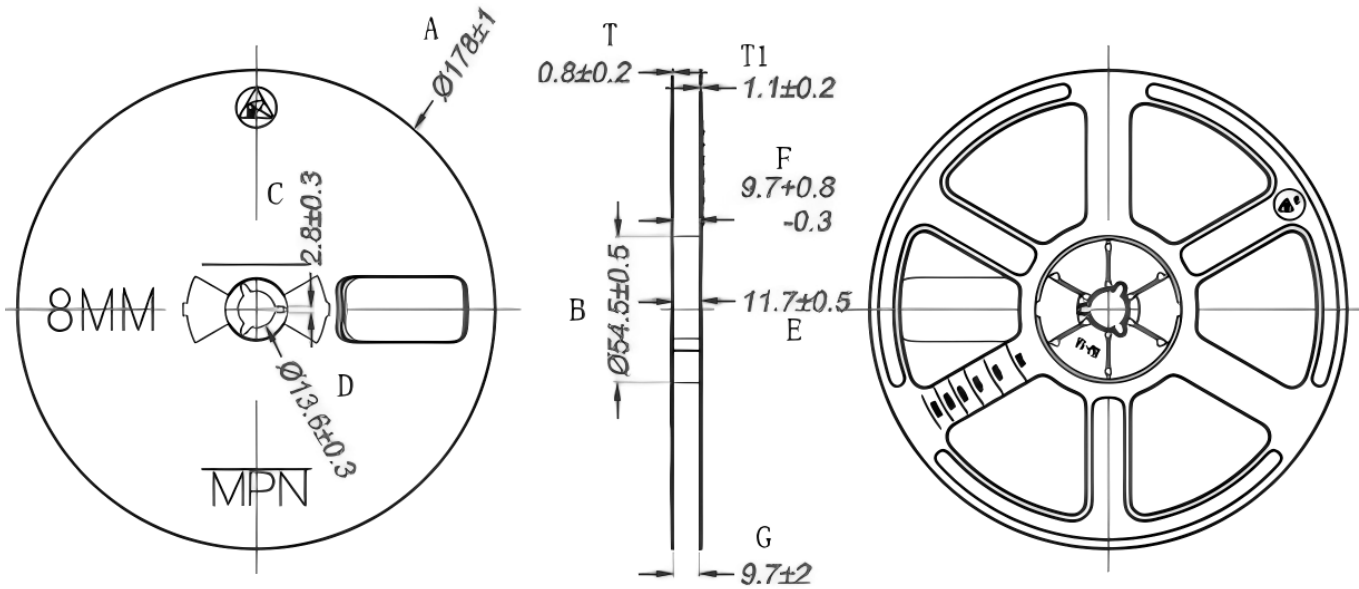


COMMON DIMENSIONS			
CUNITS MEASURE=MILLIMETER			
SYMBOL	MIN	NOM	MAX
A	1.050	---	1.300
A1	0.000	---	0.200
A2	1.050	---	1.200
b	0.300	0.400	0.500
c	0.100	---	0.200
D	2.820	2.900	3.020
E	1.500	1.600	1.700
E1	2.650	2.800	2.950
e	0.950TYP		
e1	1.800	1.900	2.000
L	0.6REF		
L1	0.300	0.450	0.600
θ	0°	--	8°

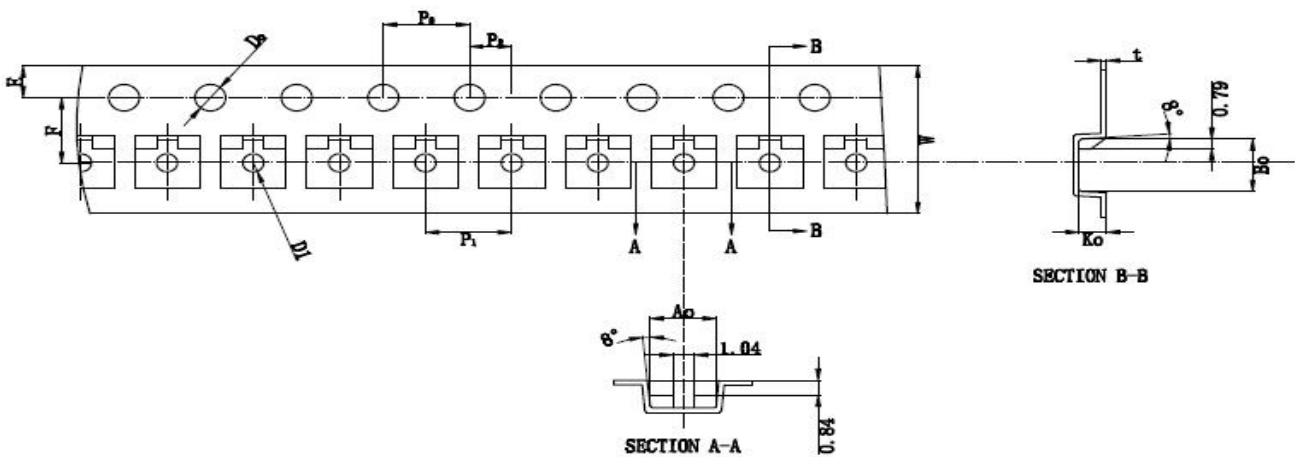
Unit:mm

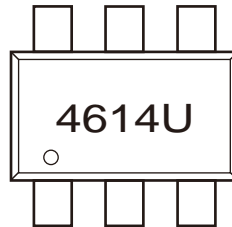
Tape & Reel Information

Dimensions in mm



PKG TYPE	W	P	E	F	D	D1	Po	Po10	P2	A0	B0	K0	T
SOT23-6	8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00	3.13	3.22	1.30	0.20
Tolerance	±0.2	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.1	±0.1	±0.1	±0.1	±0.03



Marking Information:**Previous Version**

Version	Date	Subjects (major changes since last revision)
1.0	2025-08-16	Release of final version

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