WILLAS

RoHS COMPLIANT

2N7002KLT1

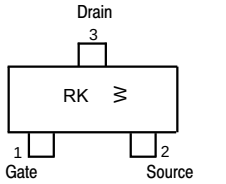
380mA N-Channel Small Signal MOSFET - 60V

PRIMARY CHARACTERISTICS

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX (Note 1)
60 V	2.3 Ω @ 10 V	380 mA
	2.7 Ω @ 5.0 V	

SOT-23 PACKAGE

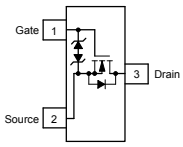
MARKING DIAGRAM & PIN ASSIGNMENT



RK = Device Code
W = Month Code



Simplified Schematic



(Top View)

FEATURES

- ESD Protected
- Low $R_{DS(on)}$
- Surface Mount Package
- This is a Pbī Free Device
- We declare that the material of product are Halogen Free and compliance with RoHS requirements.

APPLICATIONS

- Low Side Load Switch
- Level Shift Circuits
- DCī DC Converter
- Portable Applications i.e. DSC, PDA,Cell Phone,etc.

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Rating		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	60	V
Gate−to−Source Voltage		V_{GS}	±20	V
Drain Current (Note 1) Steady State	T_A = 25°C	I_D	320	mA
	T_A = 85°C		230	
t < 5 s	T_A = 25°C		380	
	T_A = 85°C		270	
Power Dissipation (Note 1) Steady State		P_D	300	mW
t < 5 s			420	
Pulsed Drain Current (t_p = 10 μs)		I_{DM}	1. 5	A
Operating Junction and Storage Temperature Range		T_J, T_{STG}	−55 to +150	°C
Source Current (Body Diode)		I_S	300	mA
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)		T_L	260	°C
Gate−Source ESD Rating (HBM, Method 3015)		ESD	2000	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	417	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 1)	$R_{\theta JA}$	300	

1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain–to–Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		60			V
Drain–to–Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				71		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			1	μA
			T_J = 125°C			500	
		V_{GS} = 0 V, V_{DS} = 50 V	T_J = 25°C			100	nA
Gate–to–Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±10	μA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.0		2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				4.0		mV/°C
Drain–to–Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 500 mA				2.3	Ω
		V_{GS} = 5.0 V, I_D = 50 mA				2.7	
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 200 mA		80			mS
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 25 V			34		pF
Output Capacitance	C_{OSS}				3		
Reverse Transfer Capacitance	C_{RSS}				2.2		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 10 V; I_D = 500 mA			0.71		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.1		
Gate–to–Source Charge	Q_{GS}				0.32		
Gate–to–Drain Charge	Q_{GD}				0.16		
SWITCHING CHARACTERISTICS, V_{GS} = V (Note 3)							
Turn–On Delay Time	$t_{d(ON)}$	V_{DS} = 10 V, V_{GEN} = 10 V, I_D = 500 mA			3.8		ns
Rise Time	t_r				3.4		
Turn–Off Delay Time	$t_{d(OFF)}$				19		
Fall Time	t_f				12		
DRAIN–SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 115 mA	T_J = 25°C			1.4	V
			T_J = 85°C		0.7		

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%
3. Switching characteristics are independent of operating junction temperatures

TYPICAL ELECTRICAL CHARACTERISTICS

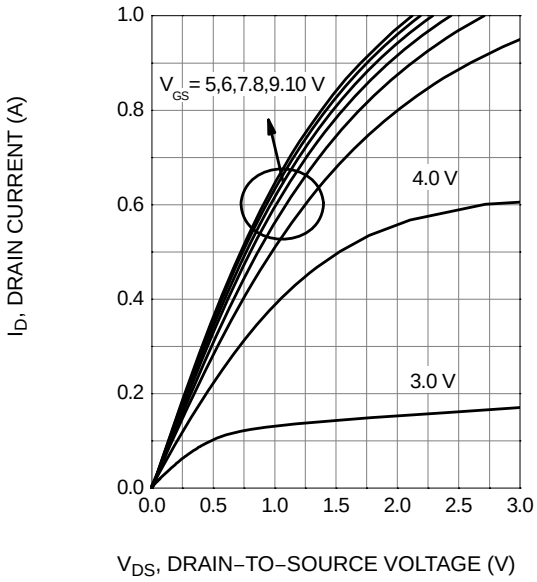


Figure 1. On−Region Characteristics

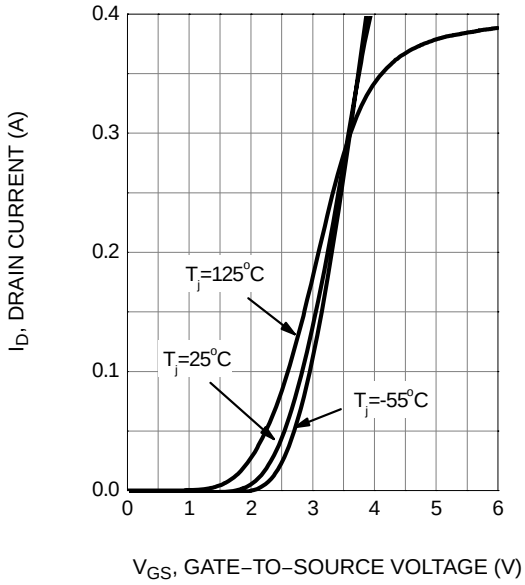


Figure 2. Transfer Characteristics

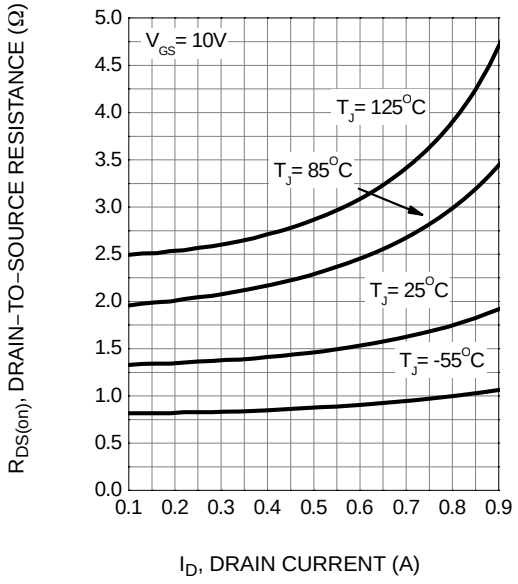


Figure 3. On−Resistance vs. Drain Current and Temperature

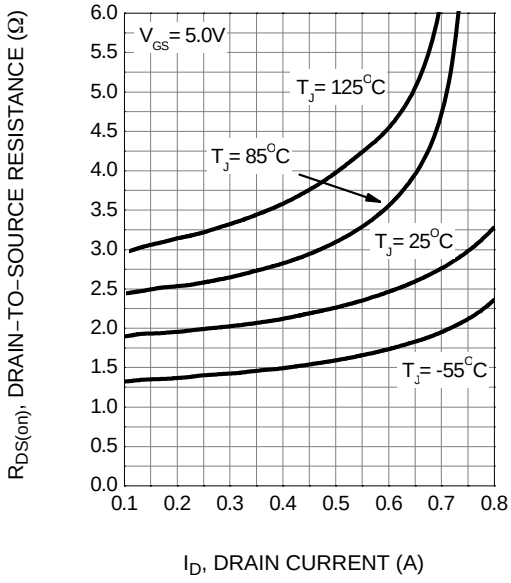


Figure 4. On−Resistance vs. Drain Current and Temperature

TYPICAL ELECTRICAL CHARACTERISTICS

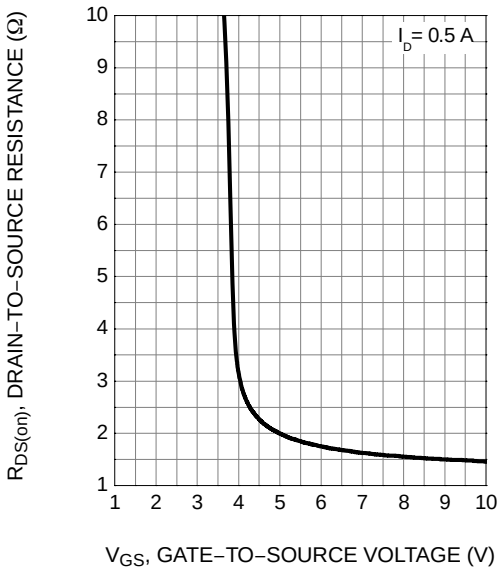


Figure 5. On–Resistance vs. Gate–to–Source Voltage

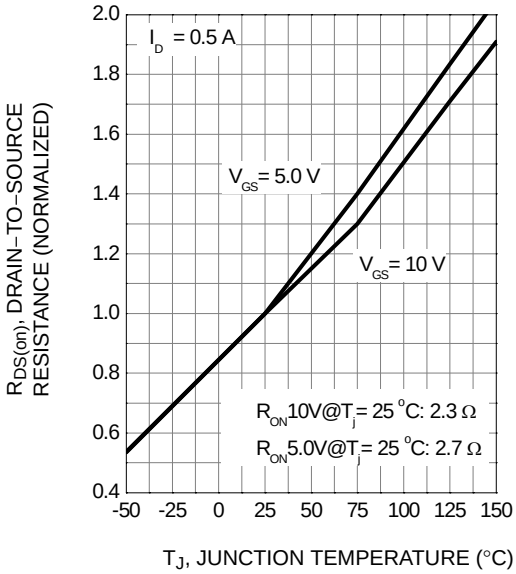


Figure 6. On–Resistance Variation with Temperature

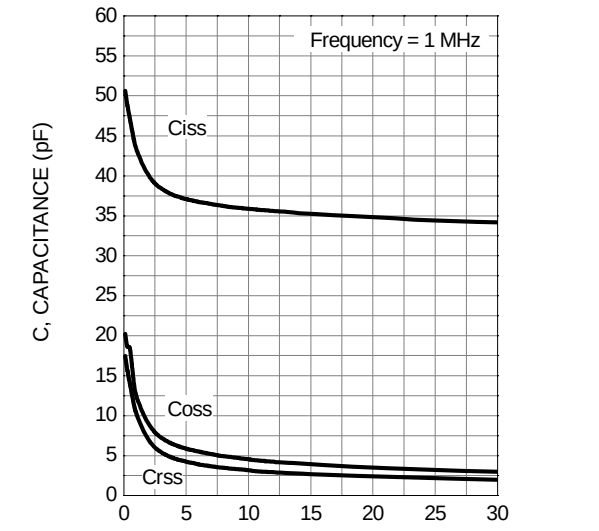


Figure 7. Capacitance Variation

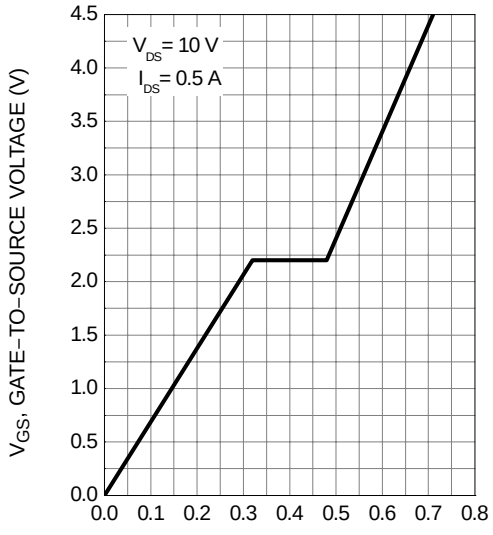


Figure 8. Gate–to–Source and Drain–to–Source Voltage vs. Total Charge

TYPICAL ELECTRICAL CHARACTERISTICS

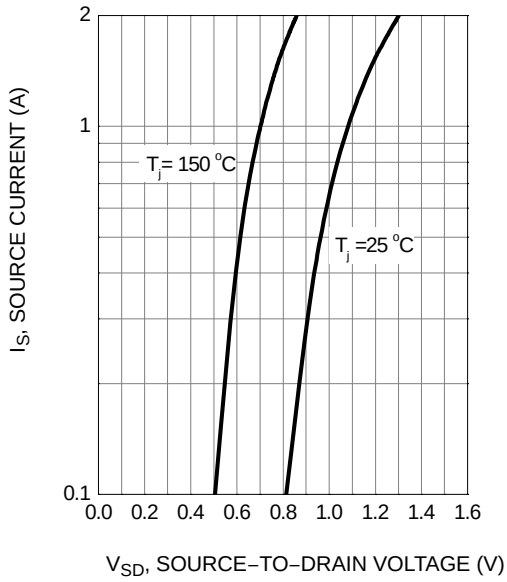
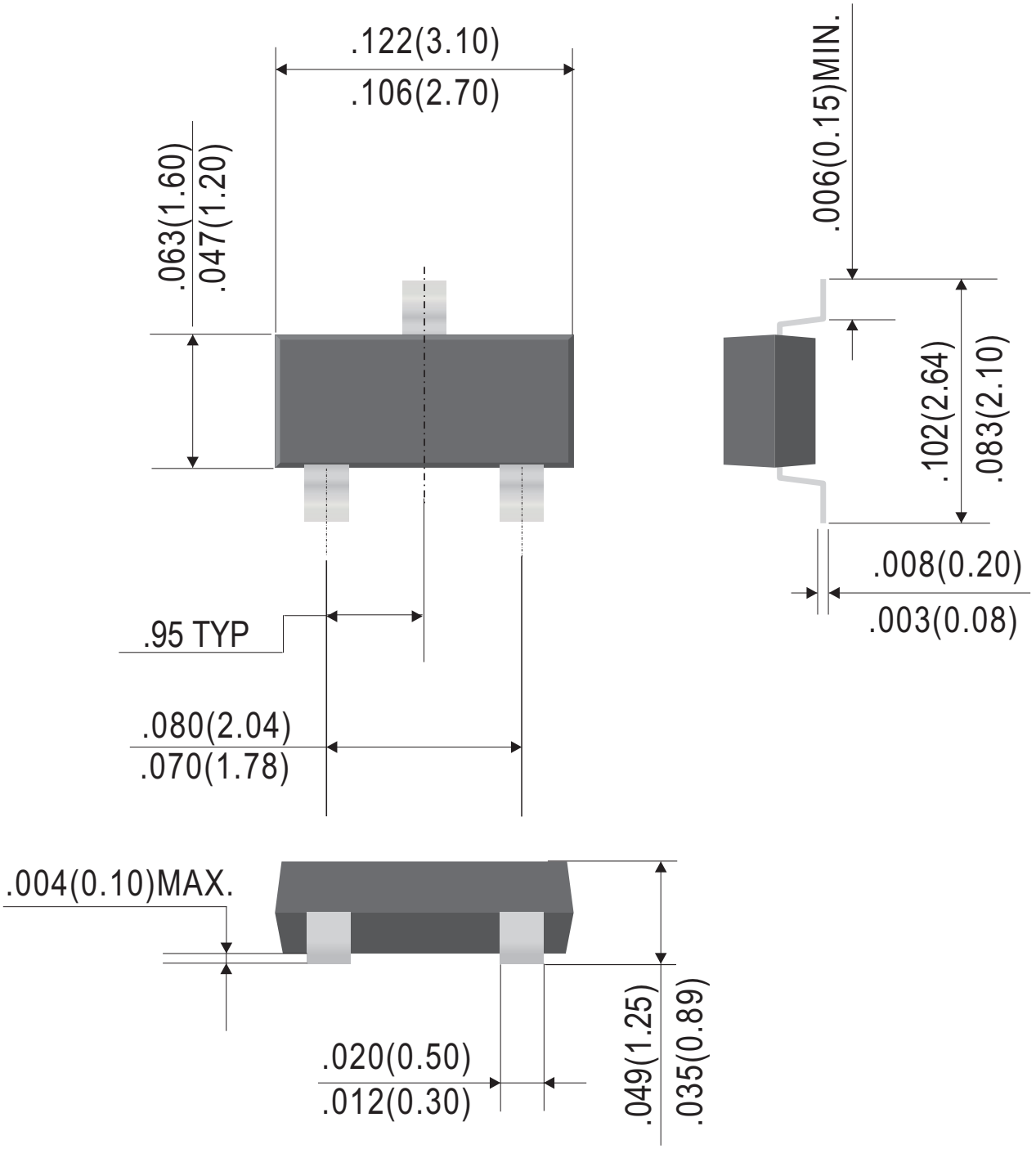


Figure 9. Diode Forward Voltage vs. Current

Outline Drawing

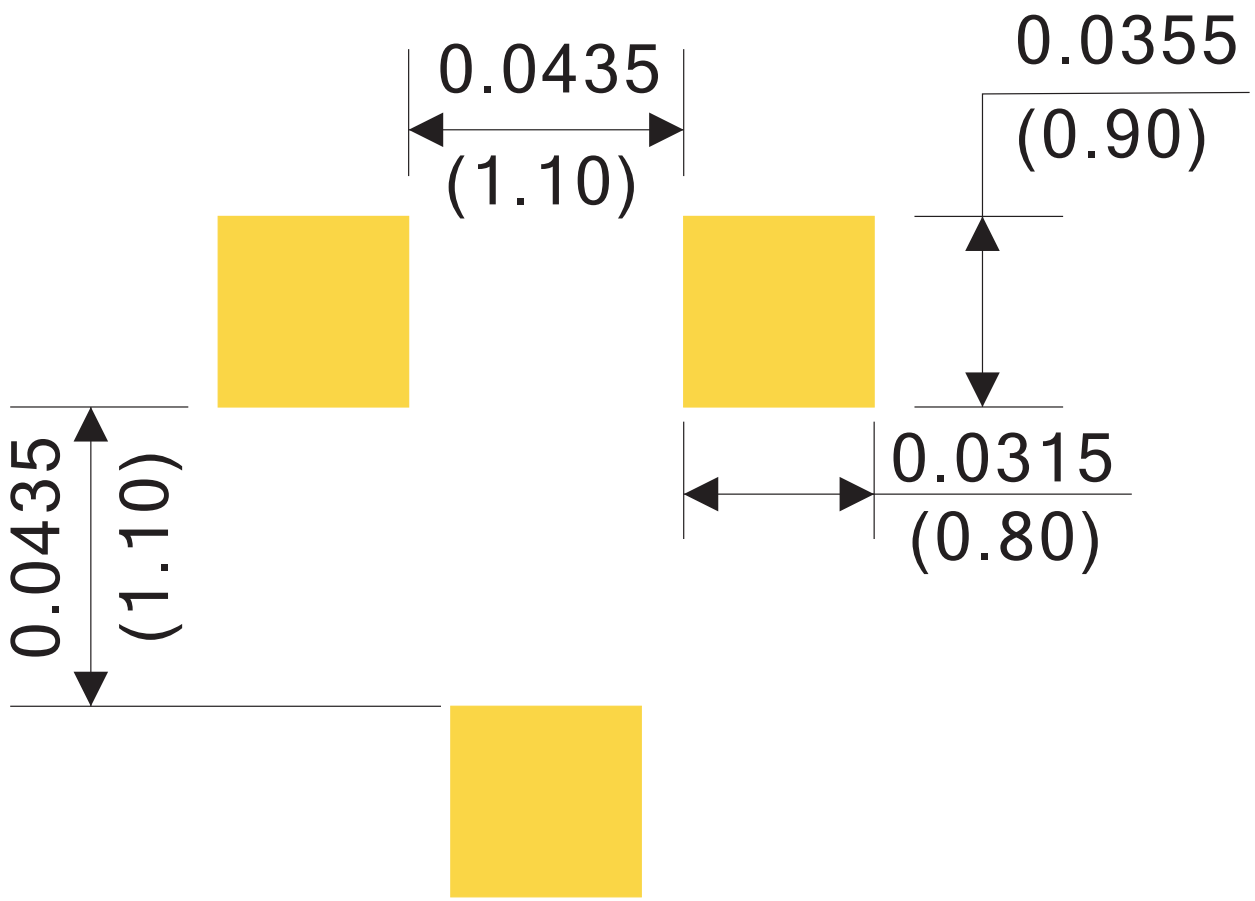
SOT-23



Dimensions in inches and (millimeters)

Rev.E

Suggested Soldering Pad Layout	SOT-23



Dimensions in inches and (millimeters)

RevA

Ordering Information:

Device PN	Packing
2N7002KLT1 -T(1) H(2)-WS	Tape&Reel: 3 Kpcs/Reel

Note: (1) Packing code, Tape & Reel Packing

(2) Halogen free product for packing code suffix "H"

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