

IPTC039N15NM5ATMA1-VB Datasheet

N-Channel 150 V (D-S) MOSFET



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

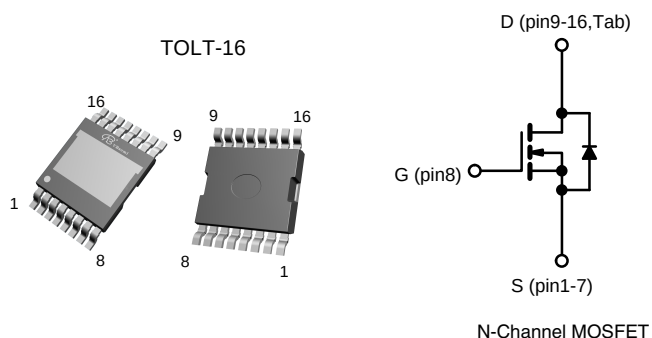
V_{DS} (V)	$R_{DS(on)}$ (Ω) MAX.	I_D (A)	Q_g (TYP.)
150	0.0062 at $V_{GS} = 10$ V	150	100 nC

FEATURES

- SGT technology Power MOSFET
- Maximum 175°C junction temperature
- 100 % R_g and UIS tested

APPLICATIONS

- Power supplies:
 - Uninterruptible power supplies
 - AC/DC switch-mode power supplies
 - Lighting
- Synchronous rectification
- DC/DC converter
- Motor drive switch
- DC/AC inverter
- Solar micro inverter
- Class D audio amplifier



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	$T_C = 25^\circ\text{C}$	I_D 150	A
	$T_C = 100^\circ\text{C}$	120	
Pulsed Drain Current ($t = 100 \mu\text{s}$)	I_{DM}	600	
Avalanche Current	I_{AS}	75	
Single Avalanche Energy ^a	E_{AS}	1370	mJ
Maximum Power Dissipation ^a	$T_C = 25^\circ\text{C}$	P_D 375 ^b	W
	$T_C = 100^\circ\text{C}$	187.5 ^b	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	62	$^\circ\text{C/W}$
Junction-to-Case (Drain)	R_{thJC}	0.4	

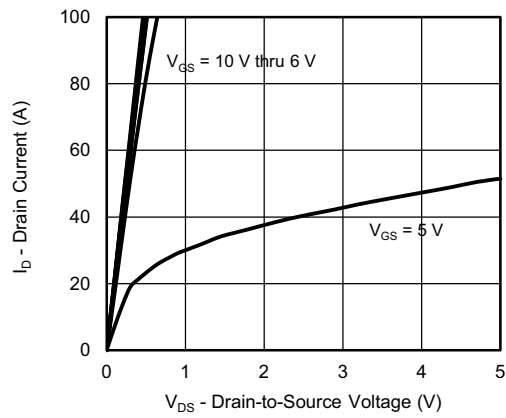
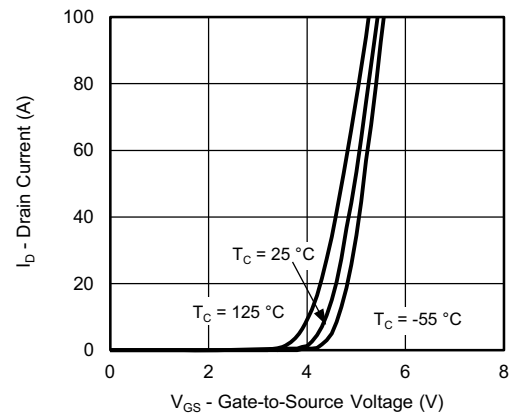
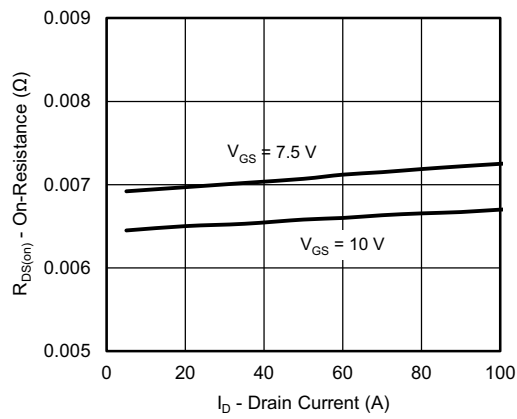
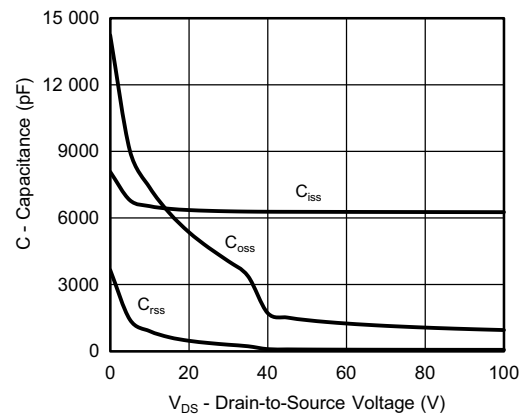
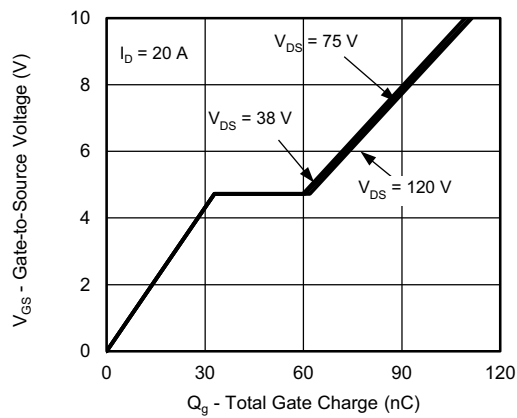
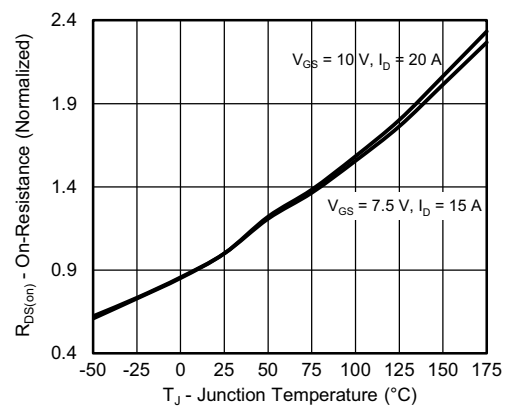
Notes

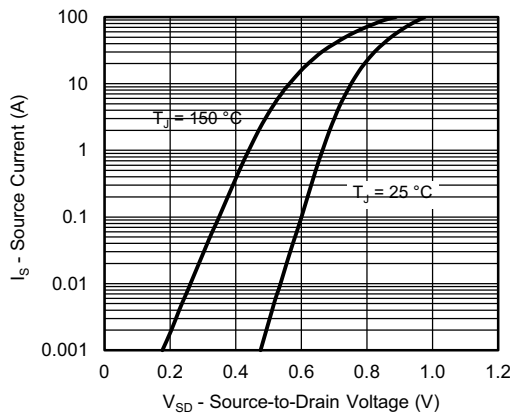
- Duty cycle $\leq 1\%$.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR4 material).

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	150	-	-	V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2	3	4	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 120 V, V _{GS} = 0 V	-	-	1	μA
		V _{DS} = 120 V, V _{GS} = 0 V, T _J = 125 °C	-	-	100	
		V _{DS} = 120 V, V _{GS} = 0 V, T _J = 150°C	-	-	5	mA
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 10 V, V _{GS} = 10 V	90	-	-	A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 60 A	-	0.0062	-	Ω
		V _{GS} = 7.5 V, I _D = 25 A	-	0.0069	-	
Forward Transconductance ^a	g _{fs}	V _{DS} = 15 V, I _D = 20 A	-	60	-	S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 75V, f = 1 MHz	-	5500	-	pF
Output Capacitance	C _{oss}		-	846	-	
Reverse Transfer Capacitance	C _{rss}		-	32	-	
Total Gate Charge ^c	Q _g	V _{DS} = 7.5 V, V _{GS} = 10 V, I _D = 20 A	-	100	-	nC
Gate-Source Charge ^c	Q _{gs}		-	30	-	
Gate-Drain Charge ^c	Q _{gd}		-	25	35	
Gate Resistance	R _g	f = 1 MHz	-	0.9	1.2	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 75 V, R _L = 1.66 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω	-	18	-	ns
Rise Time ^c	t _r		-	50	-	
Turn-Off Delay Time ^c	t _{d(off)}		-	75	-	
Fall Time ^c	t _f		-	55	-	
Drain-Source Body Diode Ratings and Characteristics ^b (T _C = 25 °C)						
Pulsed Current (t = 100 μs)	I _{SM}		-	-	100	A
Forward Voltage ^a	V _{SD}	I _F = 500 A, V _{GS} = 0 V	-	0.84	1.3	V
Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs	-	85	120	ns
Peak Reverse Recovery Charge	I _{RM(REC)}		-	11	20	A
Reverse Recovery Charge	Q _{rr}		-	0.8	1.0	μC

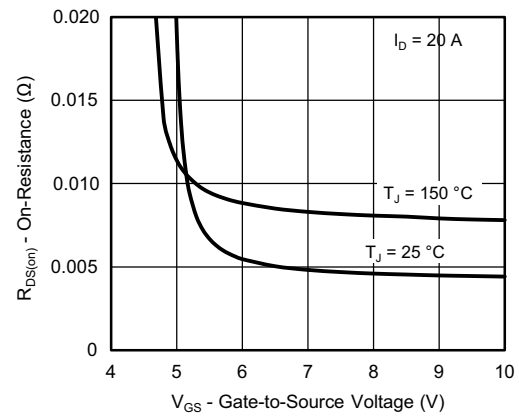
Notes

- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.
 c. Independent of operating temperature.

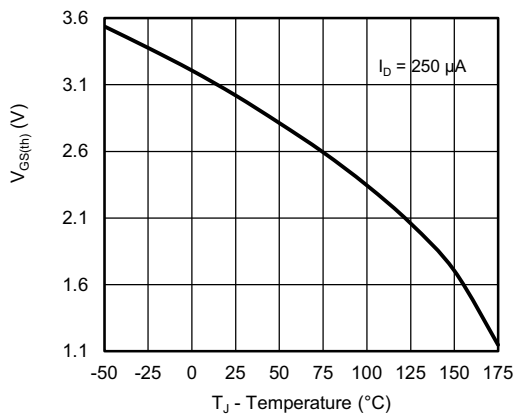
TYPICAL CHARACTERISTICS ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature



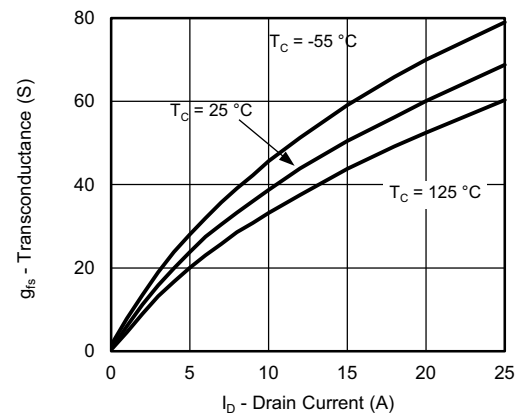
Source-Drain Diode Forward Voltage



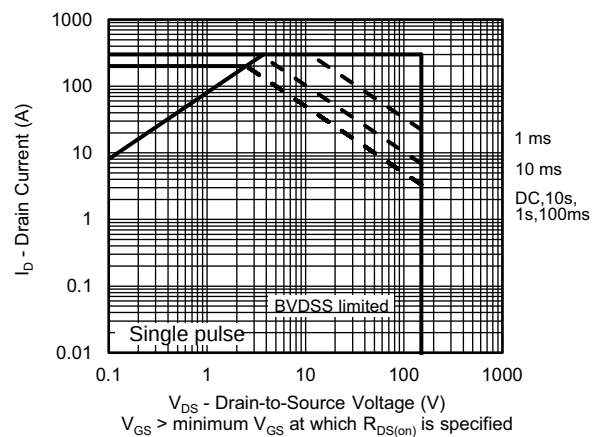
On-Resistance vs. Gate-to-Source Voltage



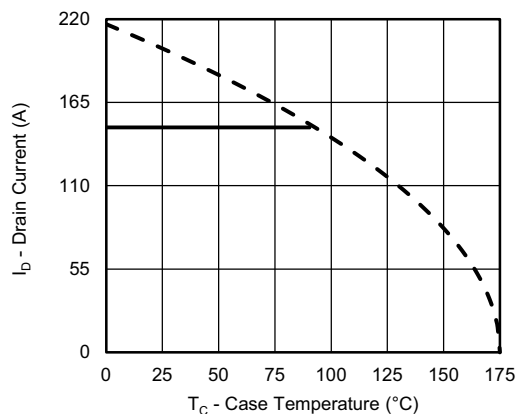
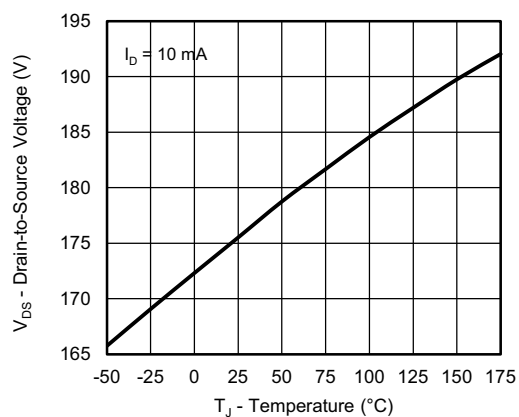
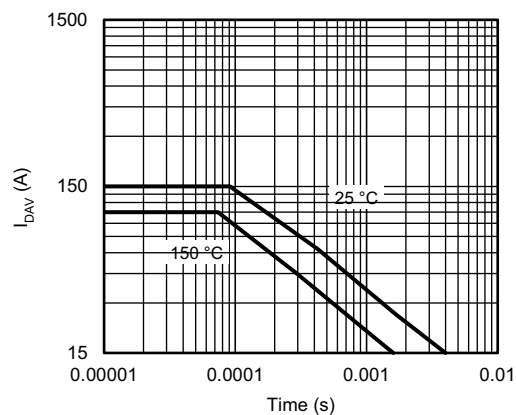
Threshold Voltage



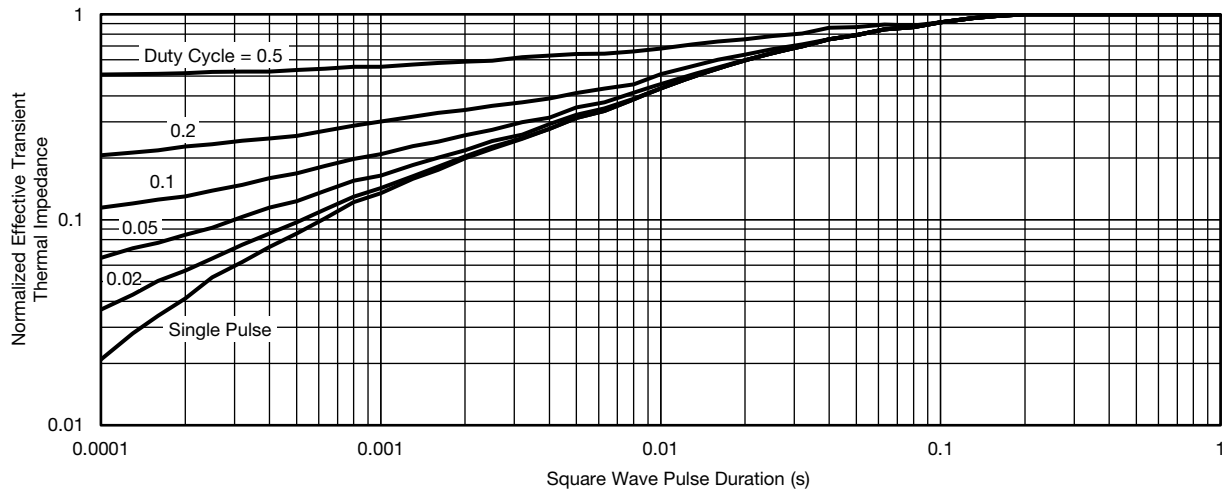
Transconductance



Safe Operating Area, Junction-to-Ambient

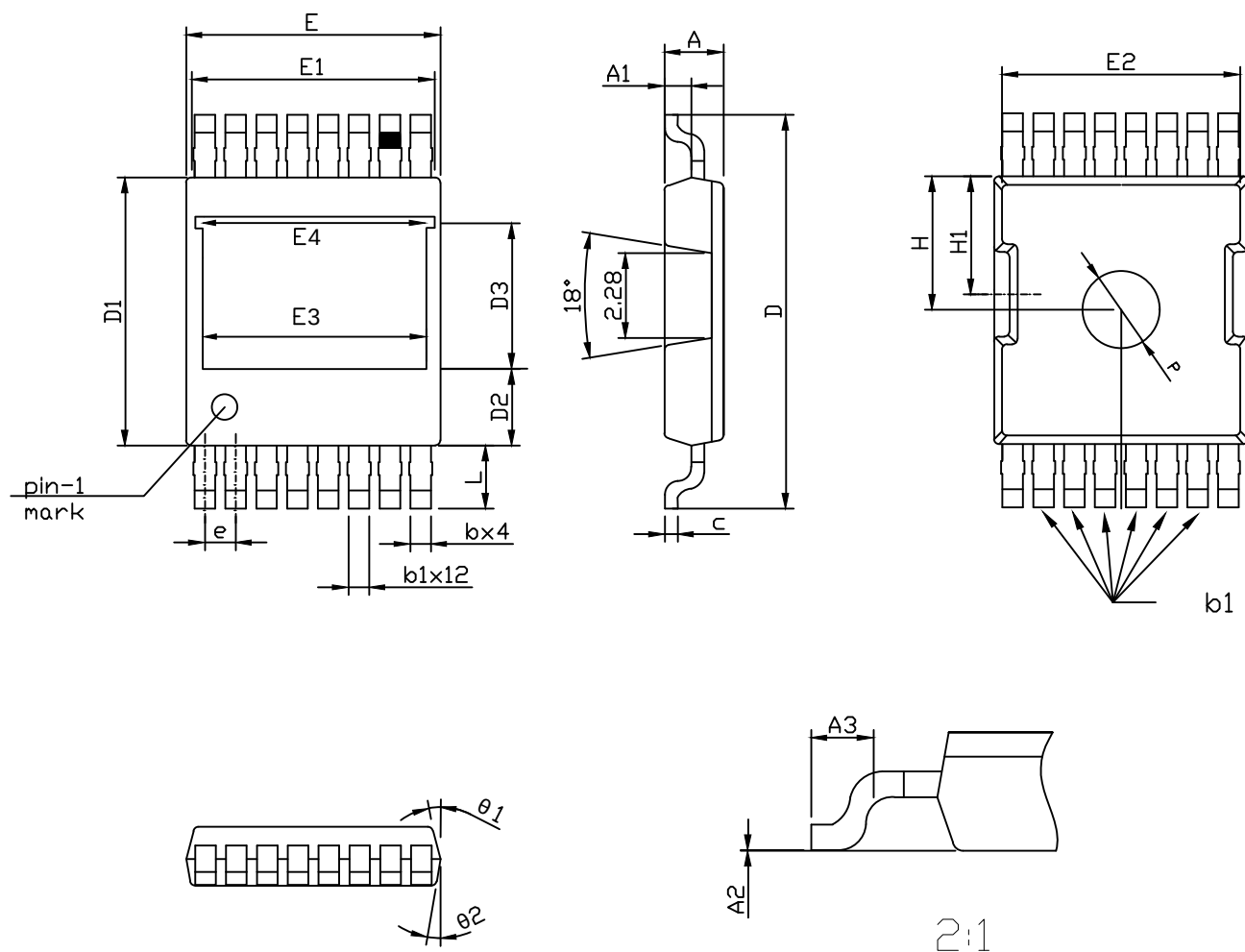
**Current Derating ^a****Drain Source Breakdown vs. Junction Temperature** **I_{DAV} vs. Time****Note**

- a. The power dissipation P_D is based on T_J max. = 25 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

THERMAL RATINGS ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)**Normalized Thermal Transient Impedance, Junction-to-Case****Note**

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction to Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction to Case ($25\text{ }^{\circ}\text{C}$)
- are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.

Package Outlines



UNIT : mm

SYMBOLS	A	A1	A2	A3	b	b1	C	D
MIN	2.25	1.00	0.01	1.50REF	0.68	0.75	0.45	14.80
NOM	2.30	1.04	0.08		0.70	0.85	0.50	15.00
MAX	2.35	1.08	0.16		0.74	0.95	0.55	15.20
SYMBOLS	D1	D2	D3	E	E1	E2	E3	E4
MIN	10.00	2.40	5.77REF	9.70	9.46REF	9.25REF	8.25REF	8.70REF
NOM	10.10	2.60		9.90				
MAX	10.30	2.80		10.10				
SYMBOLS	e	H	H1	L	P	φ1	φ2	
MIN	1.18	5.00	4.40	2.40	2.80	7 °	7 °	
NOM	1.20	5.20	4.60	2.45	3.00	-	-	
MAX	1.22	5.40	4.80	2.50	3.20	9 °	9 °	

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