

IPTC054N15NM5-VB Datasheet

N-Channel 150 V (D-S) MOSFET

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

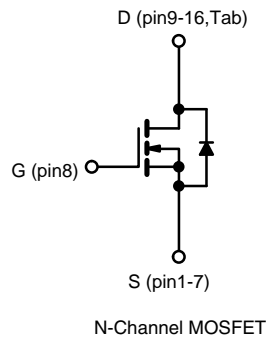
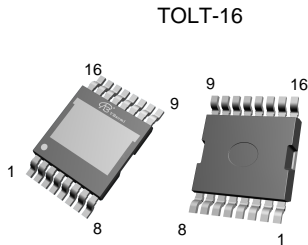
FEATURES

- 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 °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 °C)	T _C = 25 °C	150	A	
	T _C = 100 °C	120		
Pulsed Drain Current (t = 100 μs)	I _{DM}	600		
Avalanche Current	L = 0.5 mH	I _{AS}	75	
Single Avalanche Energy ^a		E _{AS}	1370	mJ
Maximum Power Dissipation ^a	T _C = 25 °C	P _D	375 ^b	W
	T _C = 100 °C		187.5 ^b	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55 to +175	°C	

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	62	°C/W
Junction-to-Case (Drain)	R _{thJC}	0.4	

Notes

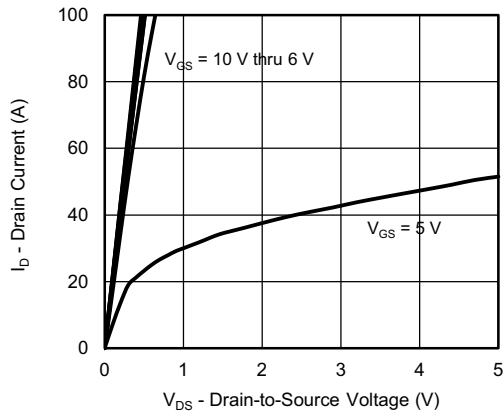
- a. Duty cycle ≤ 1 %.
- b. See SOA curve for voltage derating.
- c. When mounted on 1" square PCB (FR4 material).

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	150	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2	3	4	
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$	-	-	± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$	-	-	100	
		$V_{DS} = 120\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$	-	-	5	mA
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	90	-	-	A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 60\text{ A}$	-	0.0062	-	Ω
		$V_{GS} = 7.5\text{ V}, I_D = 25\text{ A}$	-	0.0069	-	
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	-	60	-	S
Dynamic ^b						
Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, V_{DS} = 75\text{ V}, f = 1\text{ MHz}$	-	5500	-	pF
Output Capacitance	C_{OSS}		-	846	-	
Reverse Transfer Capacitance	C_{RSS}		-	32	-	
Total Gate Charge ^c	Q_g	$V_{DS} = 7.5\text{ V}, V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	-	100	-	nC
Gate-Source Charge ^c	Q_{gs}		-	30	-	
Gate-Drain Charge ^c	Q_{gd}		-	25	35	
Gate Resistance	R_g	$f = 1\text{ MHz}$	-	0.9	1.2	Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = 75\text{ V}, R_L = 1.66\text{ }\Omega$ $I_D \cong 50\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$	-	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 ($T_C = 25\text{ }^\circ\text{C}$)						
Pulsed Current ($t = 100\text{ }\mu\text{s}$)	I_{SM}		-	-	100	A
Forward Voltage ^a	V_{SD}	$I_F = 500\text{ A}, V_{GS} = 0\text{ V}$	-	0.84	1.3	V
Reverse Recovery Time	t_{rr}	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	-	85	120	ns
Peak Reverse Recovery Charge	$I_{RM(REC)}$		-	11	20	A
Reverse Recovery Charge	Q_{rr}		-	0.8	1.0	μC

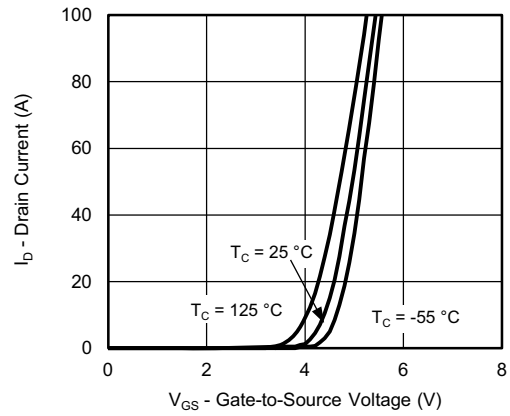
Notes

- 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.

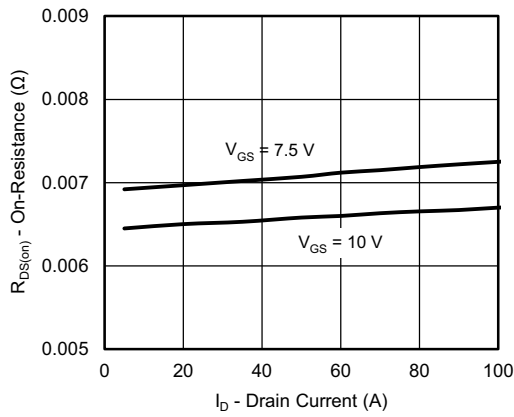
TYPICAL CHARACTERISTICS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)



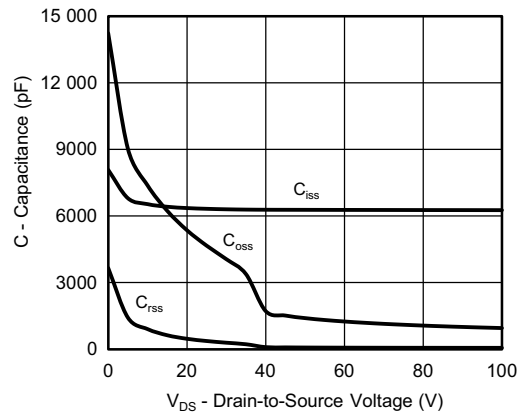
Output Characteristics



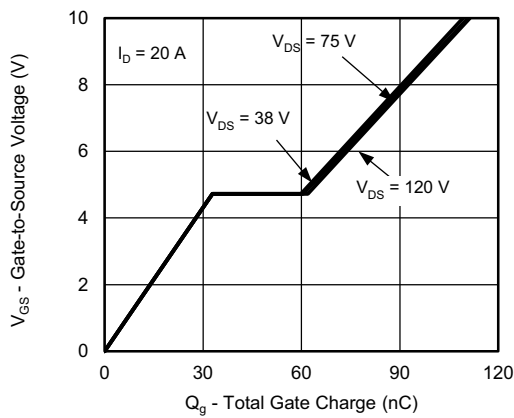
Transfer Characteristics



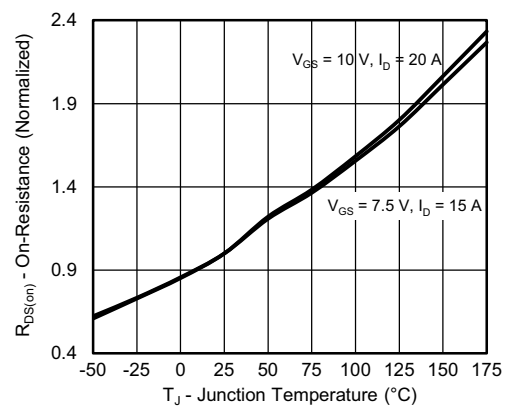
On-Resistance vs. Drain Current and Gate Voltage



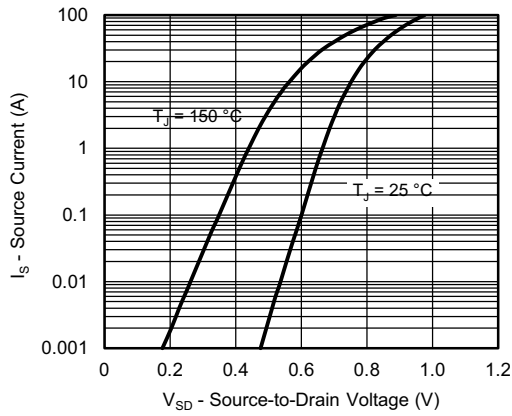
Capacitance



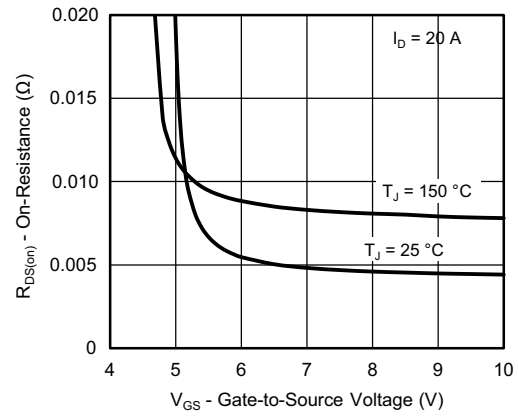
Gate Charge



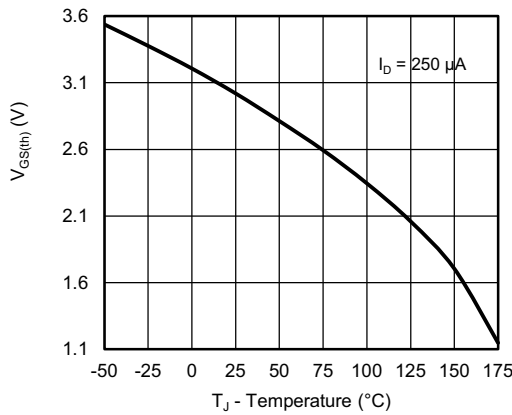
On-Resistance vs. Junction Temperature



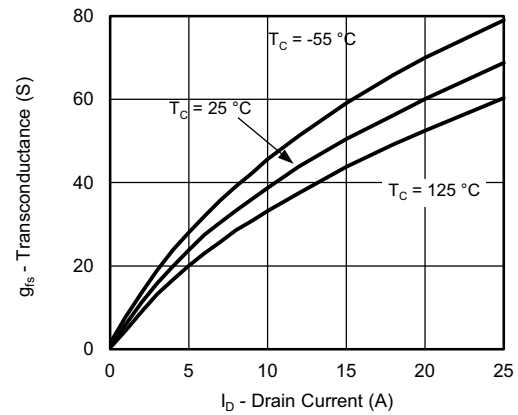
Source-Drain Diode Forward Voltage



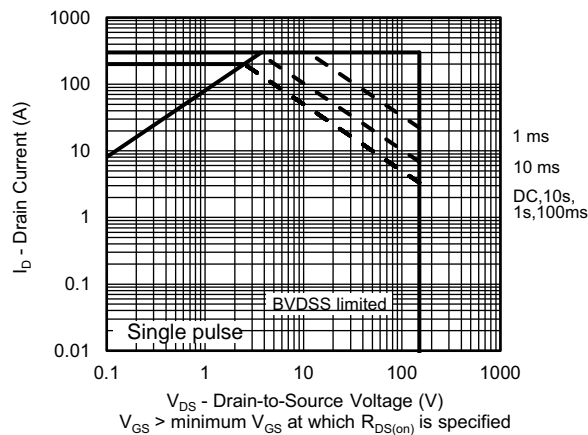
On-Resistance vs. Gate-to-Source Voltage



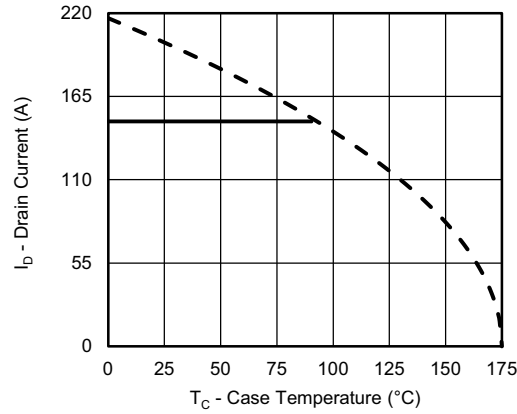
Threshold Voltage



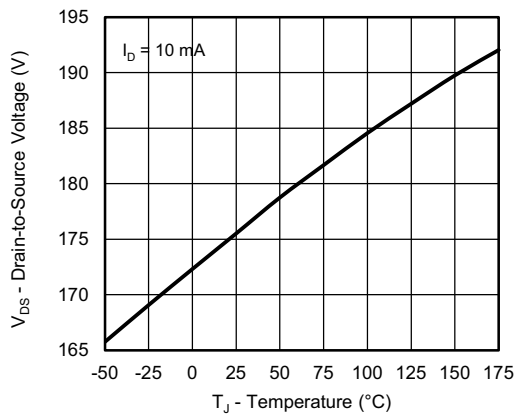
Transconductance



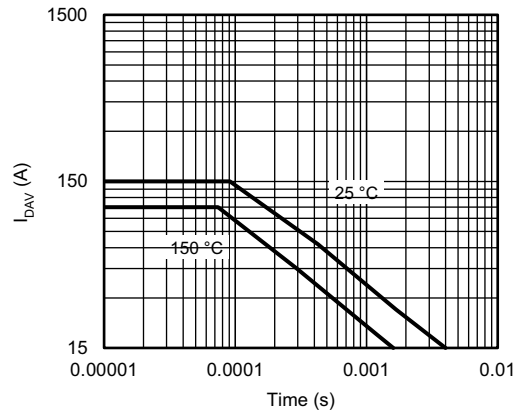
Safe Operating Area, Junction-to-Ambient



Current Derating ^a



Drain Source Breakdown vs. Junction Temperature

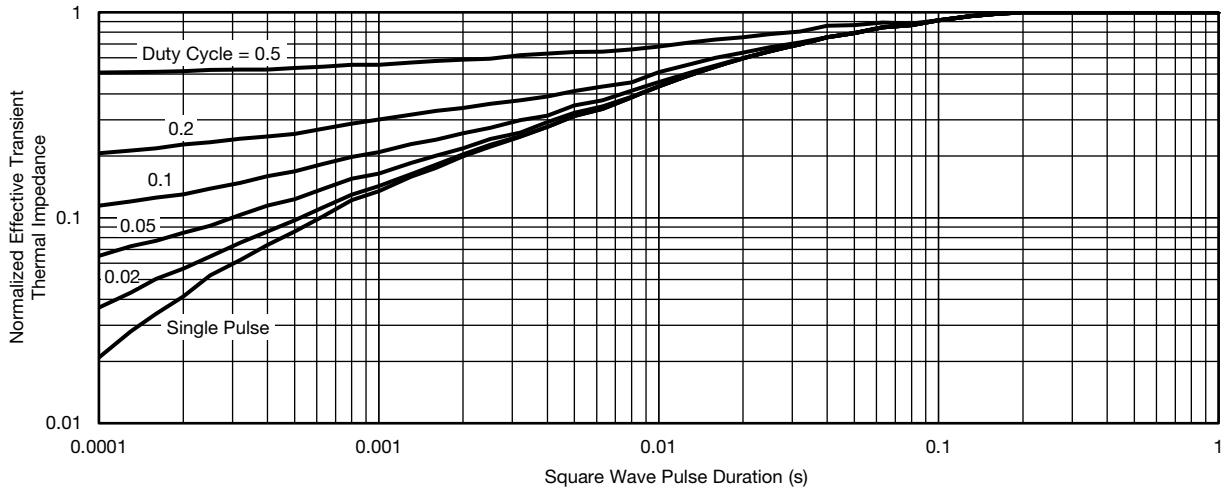


IBAV vs. Time

Note

- a. The power dissipation P_D is based on $T_J \text{ max.} = 25 \text{ }^\circ\text{C}$, 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)

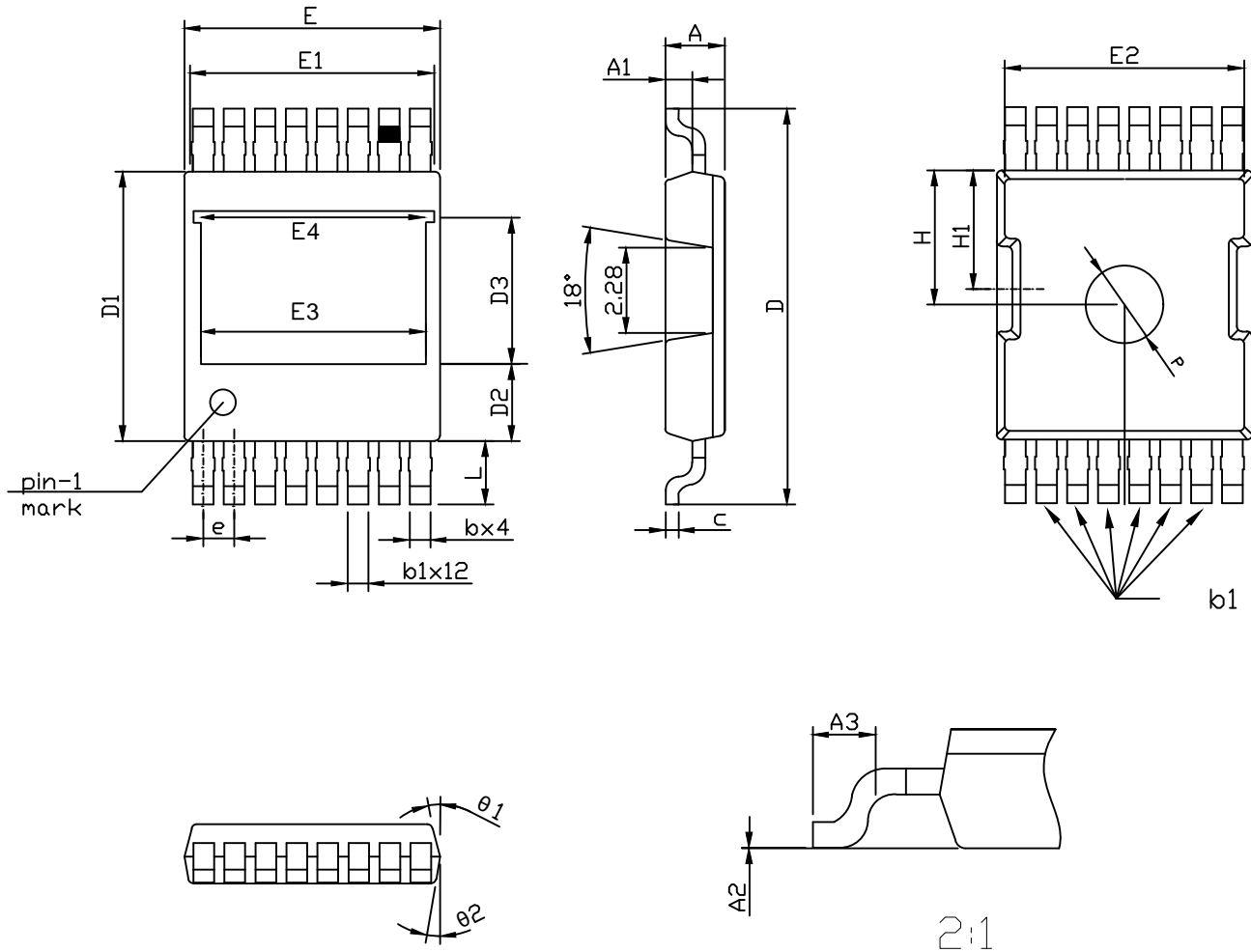


Normalized Thermal Transient Impedance, Junction-to-Case

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	1	2	
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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