

## P-Channel 1.8-V (G-S) MOSFET

**LSI1013XT1G**  
**S-LSI1013XT1G**

### FEATURES

- TrenchFET® Power MOSFET: 1.8-V Rated
- Gate-Source ESD Protected: 2000 V
- High-Side Switching
- Low On-Resistance: 1.2  $\Omega$
- Low Threshold: 0.8 V (typ)
- Fast Switching Speed: 14 ns
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

### BENEFITS

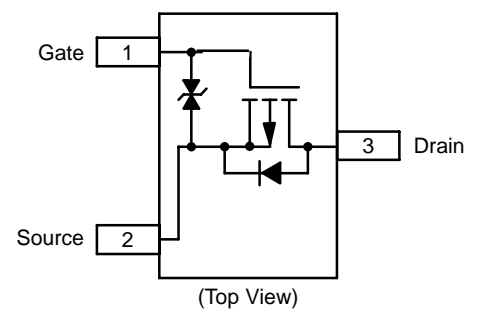
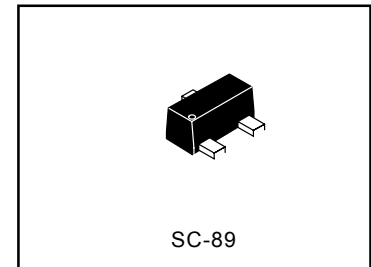
- Ease in Driving Switches
- Low Offset (Error) Voltage
- Low-Voltage Operation
- High-Speed Circuits
- Low Battery Voltage Operation

### APPLICATIONS

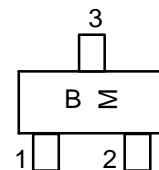
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

### ORDERING INFORMATION

Device	Marking	Shipping
LSI1013XT1G S-LSI1013XT1G	B	3000/Tape&Reel
LSI1013XT3G S-LSI1013XT3G	B	10000/Tape&Reel



### MARKING DIAGRAM



B = Specific Device Code  
M = Month Code

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)					
Parameter	Symbol	5 secs	Steady State	Unit	
Drain-Source Voltage	$V_{DS}$		-20	V	
Gate-Source Voltage	$V_{GS}$		$\pm 6$		
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) <sup>b</sup>	$I_D$	$T_A = 25^\circ\text{C}$	-400	-350	mA
		$T_A = 85^\circ\text{C}$	-300	-275	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$		-1000		
Continuous Source Current (diode conduction) <sup>b</sup>	$I_S$	-275	-250		
Maximum Power Dissipation <sup>b</sup> for SC-75	$P_D$	$T_A = 25^\circ\text{C}$	175	150	mW
		$T_A = 85^\circ\text{C}$	90	80	
Maximum Power Dissipation <sup>b</sup> for SC-89	$P_D$	$T_A = 25^\circ\text{C}$	275	250	
		$T_A = 85^\circ\text{C}$	160	140	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150		$^\circ\text{C}$	
Gate-Source ESD Rating (HBM, Method 3015)	ESD	2000		V	

#### Notes

- d. Pulse width limited by maximum junction temperature.  
e. Surface Mounted on FR4 Board.

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SPECIFICATIONS (T <sub>A</sub> = 25 °C UNLESS OTHERWISE NOTED)						
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μA	-0.45		-1.3	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±4.5 V		±1	±2	μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V		-0.3	-100	nA
		V <sub>DS</sub> = -16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85 °C			-5	μA
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = -5 V, V <sub>GS</sub> = -4.5 V	-700			mA
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -350 mA		0.8	1.2	Ω
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -300 mA		1.2	1.6	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -10 mA		1.8	2.7	
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -250 mA		0.4		S
Diode Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>S</sub> = -150 mA, V <sub>GS</sub> = 0 V		-0.8	-1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -10 V, V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -250 mA		1500		pC
Gate-Source Charge	Q <sub>gs</sub>			150		
Gate-Drain Charge	Q <sub>gd</sub>			450		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = -10 V, R <sub>L</sub> = 47 Ω I <sub>D</sub> ≅ -200 mA, V <sub>GEN</sub> = -4.5 V, R <sub>G</sub> = 10 Ω		5		ns
Rise Time	t <sub>r</sub>			9		
Turn-Off Delay Time	t <sub>d(off)</sub>			35		
Fall Time	t <sub>f</sub>			11		

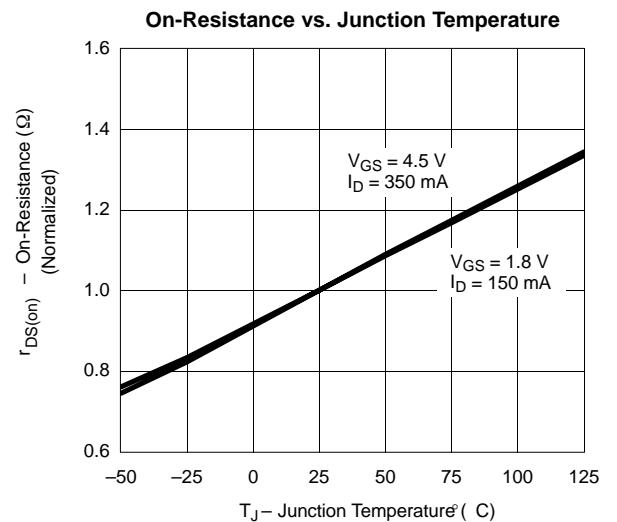
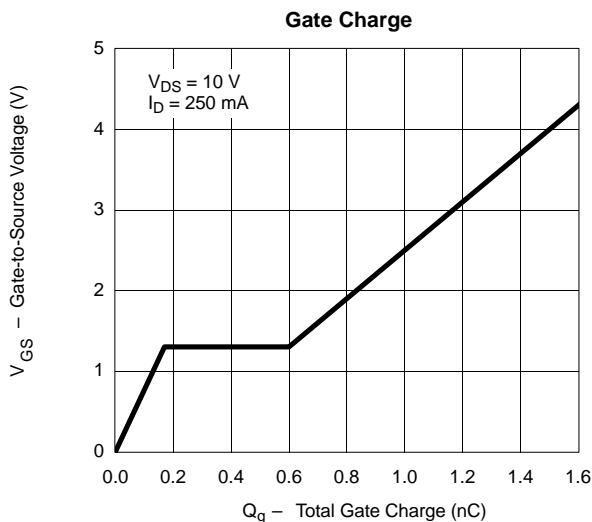
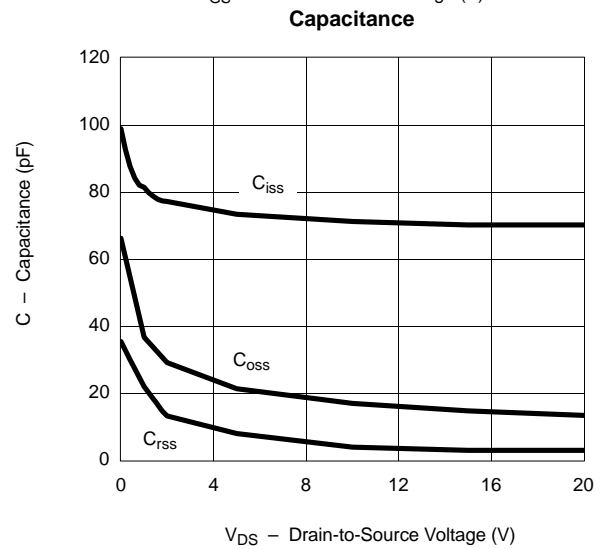
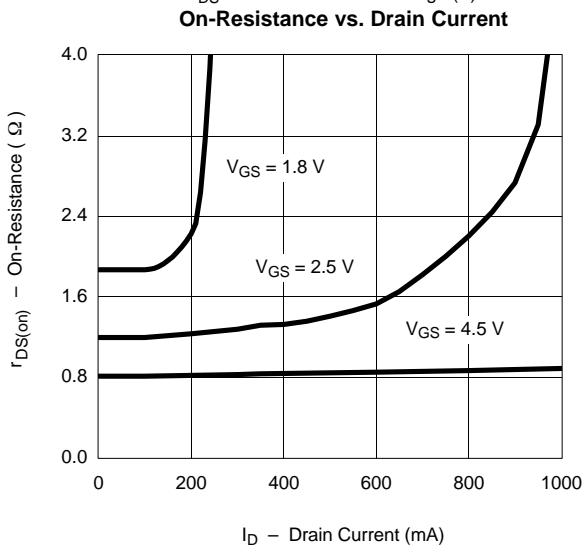
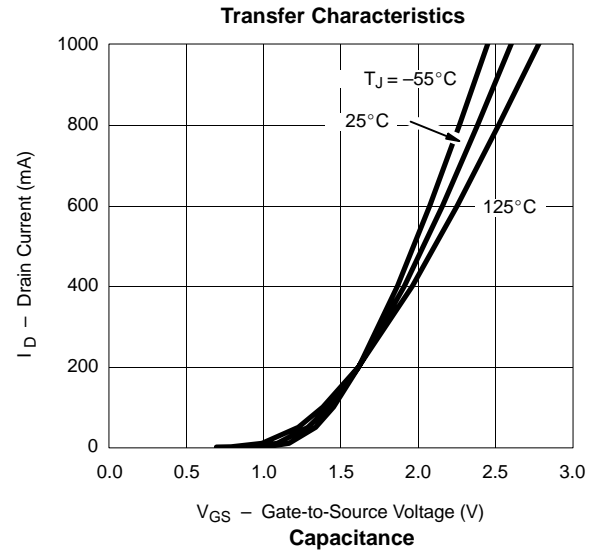
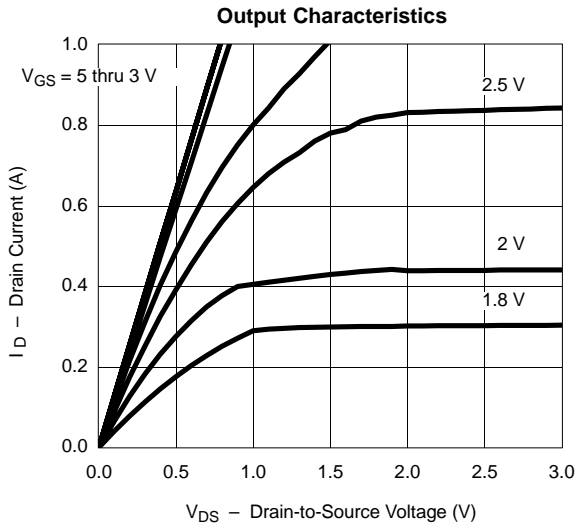
## Notes

- a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.  
 b. Guaranteed by design, not subject to production testing.

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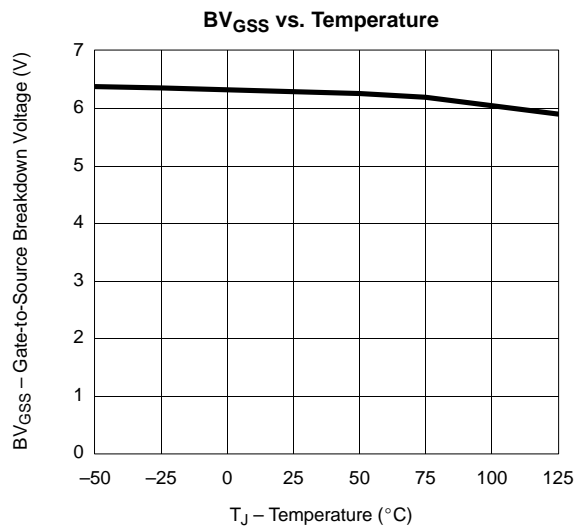
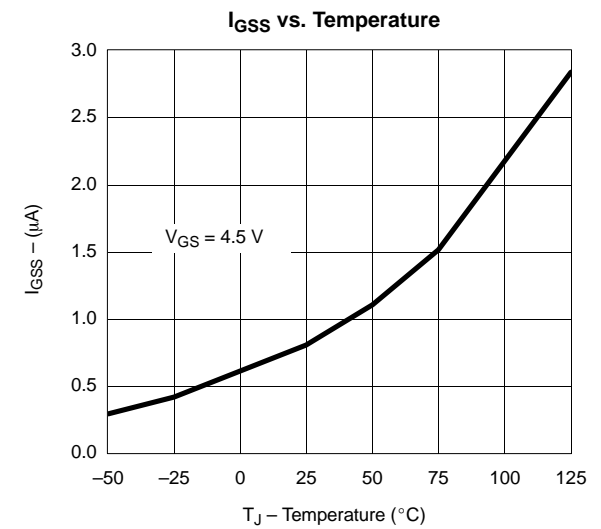
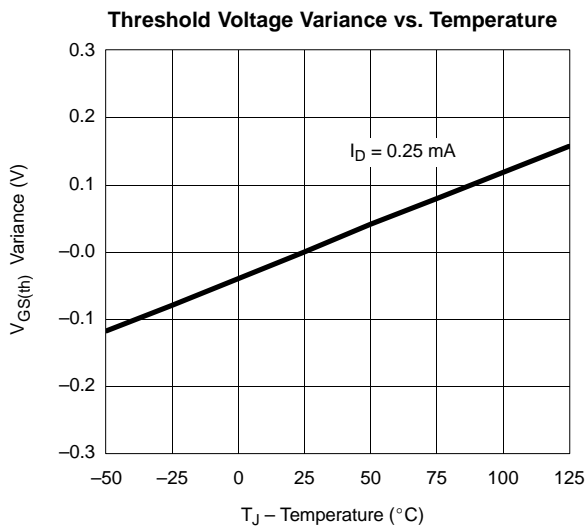
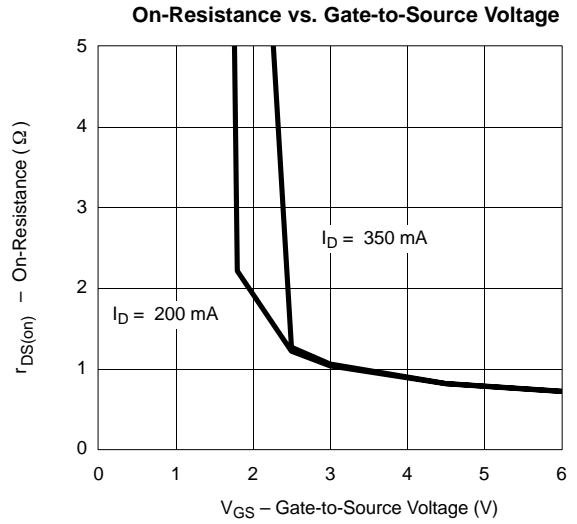
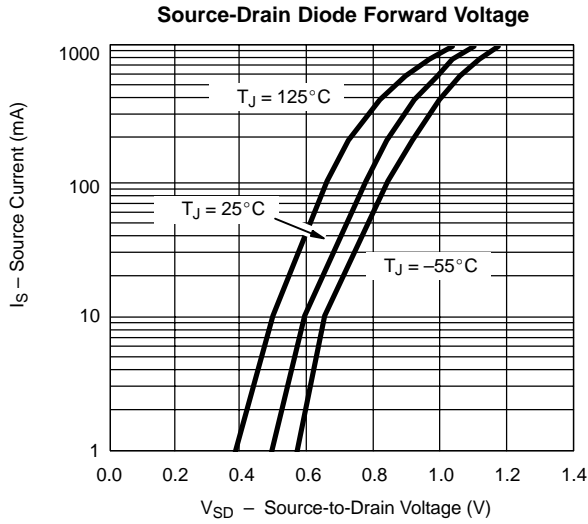
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C UNLESS NOTED)**

For the following graphs, p-channel negative polarities for all voltage and current values are represented as positive values.



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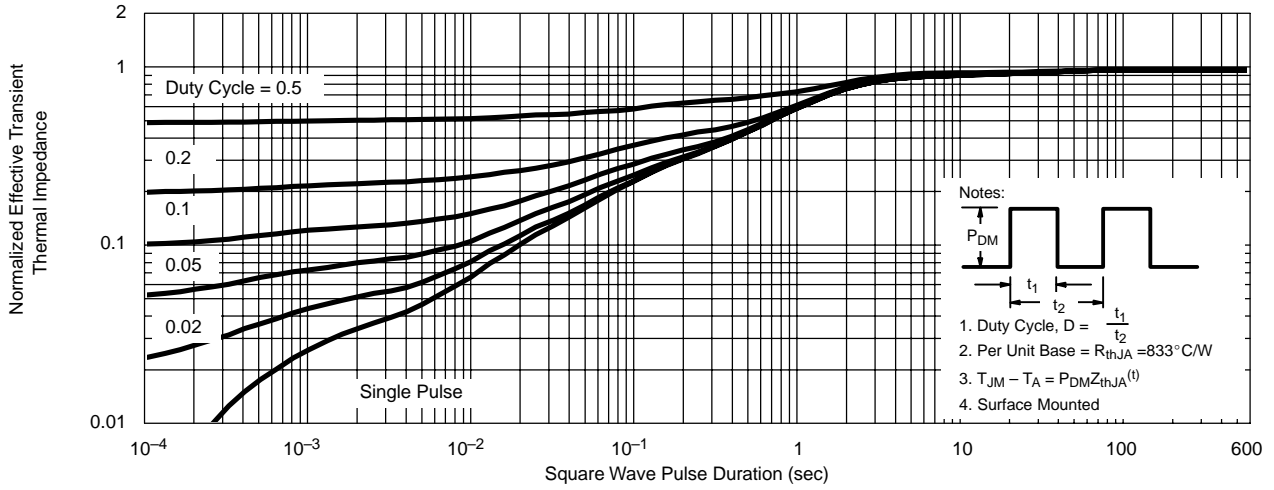
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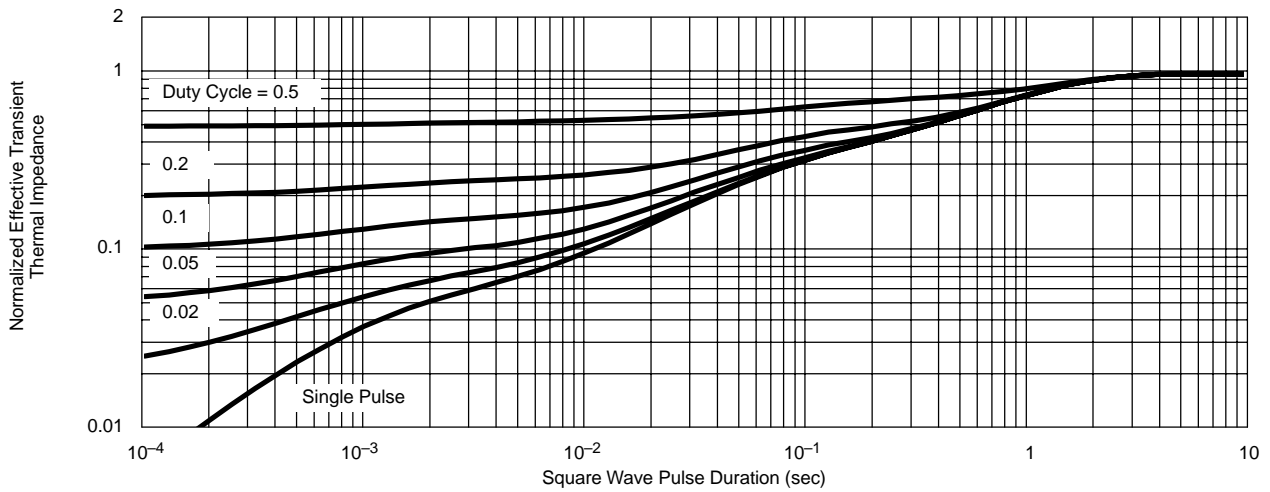
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**TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  UNLESS NOTED)**

Normalized Thermal Transient Impedance, Junction-to-Ambient (SC-75A)

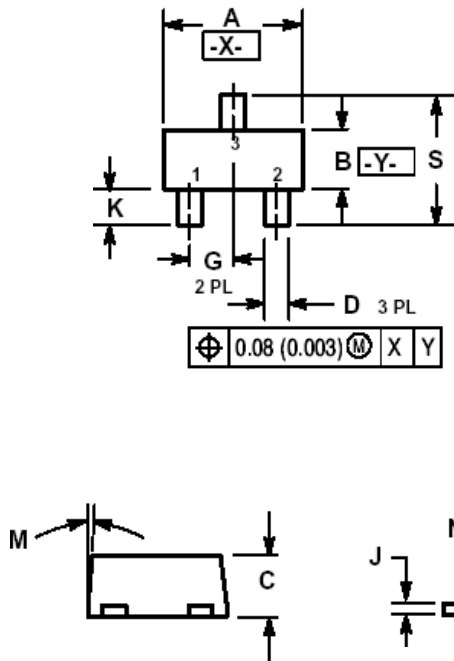


Normalized Thermal Transient Impedance, Junction-to-Foot



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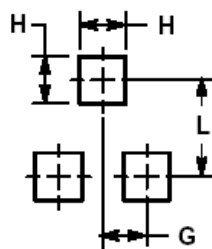
SC-89



NOTES:

- 1.DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- 2.CONTROLLING DIMENSION: MILLIMETERS
- 3.MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
- 4.463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067



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