

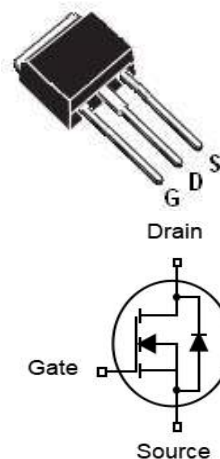
Features

- High ruggedness
- Low RDS(ON)
- Low Gate Charge
- Improved dv/dt Capability
- 100% Avalanche Tested
- 100% EAS Tested



Part ID	Package Type	Marking	Packing
ZT65R1K2	TO-251	ZT65R1K2	4500pcs/Tape

V_{DS}	650	V
$R_{DS(on),TYP@ V_{GS}=10V}$	1	Ω
I_D	4	A

TO-251


Absolute Maximum Ratings $T_A = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_c=25^\circ\text{C}$ Unless Otherwise Noted)				
V_{GS}	Gate-Source Voltage	± 30	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650	V	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_{DM}	Drain Current-Continuous@ Current-Pulsed (Note 1)	$T_c = 25^\circ\text{C}$ 12	A	
Mounted on Large Heat Sink				
I_D	Drain Current-Continuous (Note 1)	$T_c = 25^\circ\text{C}$	4	A
		$T_c = 100^\circ\text{C}$	2.5	A
P_D	Maximum Power Dissipation	50	W	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.5	$^\circ\text{C/W}$	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	125	$^\circ\text{C/W}$	
Drain-Source Avalanche Ratings				
EAS	Avalanche Energy, Single Pulsed (Note 3)	45	mJ	
E_{AR}	Repetitive Avalanche Energy (Note 2)	5	mJ	
dv/dt	MOSFET dv/dt ruggedness (@ $V_{DS}=0\sim 480\text{V}$)	50	V/ns	
dv/dt	Peak diode recovery dv/dt($V_{DS}=0\sim 480\text{V}$, $I_{SD}\leq I_D$)	15	V/ns	

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T_J=25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	650	--	--	V
I _{DSS}	Drain to source leakage current	V _{DS} =650V, V _{GS} =0V	--	--	1	μA
		V _{DS} =520V, T _J =125°C	--	--	50	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±30V, V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.5	3.5	4.5	V
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =2A	--	1	1.2	Ω
G _{fs}	Forward transconductance	V _{DS} =30V, I _D =2A	--	2.0	--	S
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =200V, V _{GS} =0V, f=1MHz	--	179	--	pF
C _{oss}	Output Capacitance		--	18	--	pF
C _{rss}	Reverse Transfer Capacitance		--	1.2	--	pF
R _g	Gate Resistance	f=1MHz	--	28	--	Ω
Q _g	Total Gate Charge	V _{DS} =520V, I _D =4A, V _{GS} =10V, I _G =1mA,	--	9.2	--	nC
Q _{gs}	Gate-Source Charge		--	0.9	--	nC
Q _{gd}	Gate-Drain Charge		--	6.3	--	nC
Switching Characteristics						
T _{d(on)}	Turn-on Delay Time	V _{DS} =325V, I _D =4A, R _G =10Ω, V _{GS} =10V	--	8.9	--	ns
T _r	Turn-on Rise Time		--	26.8	--	ns
T _{d(off)}	Turn-Off Delay Time		--	8.9	--	ns
T _f	Turn-Off Fall Time		--	22.7	--	ns
Source- Drain Diode Characteristics @ T_J = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _S =8A, V _{GS} =0V	--	--	1.4	V
T _{rr}	Reverse Recovery Time	T _J =25°C, I _S =8A, V _{GS} =0V di/dt=100A/μs	--	197	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.2	--	μC
I _{rrm}	Peak reverse recovery current		--	10.5	--	A

Notes:

1. Drain current is limited by maximum junction temperature.
2. Repetitive rating : pulse width limited by junction temperature.
3. L = 40mH, I_{AS} = 1.5A, V_{DD} = 100V, R_G=25Ω, Starting at T_J = 25°C

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

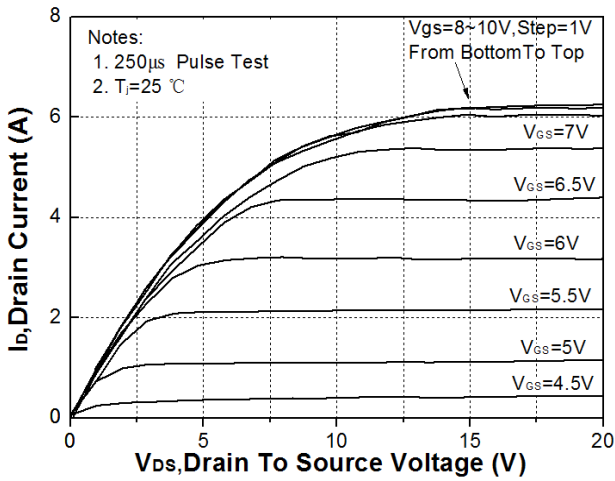


Fig 1. Output characteristics ($T_J=25^\circ\text{C}$)

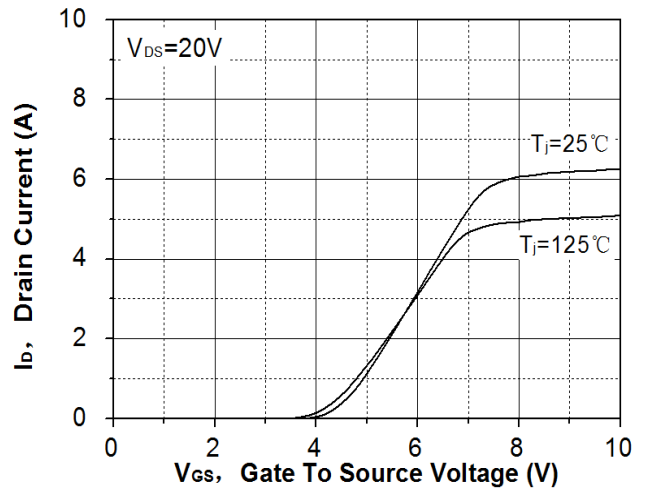


Fig 2. Transfer characteristics

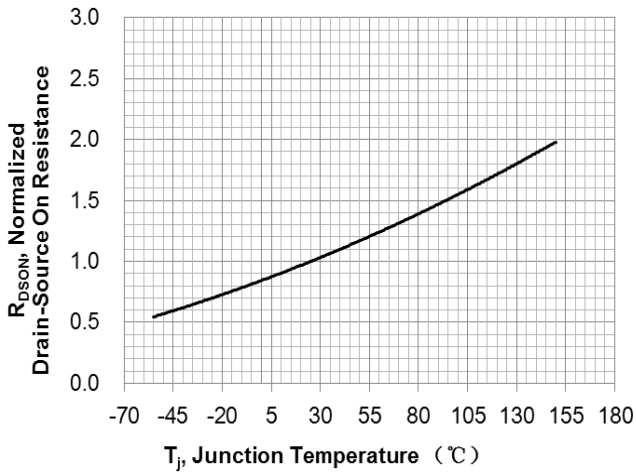


Fig 3. $R_{DS(ON)}$ vs Junction Temperature

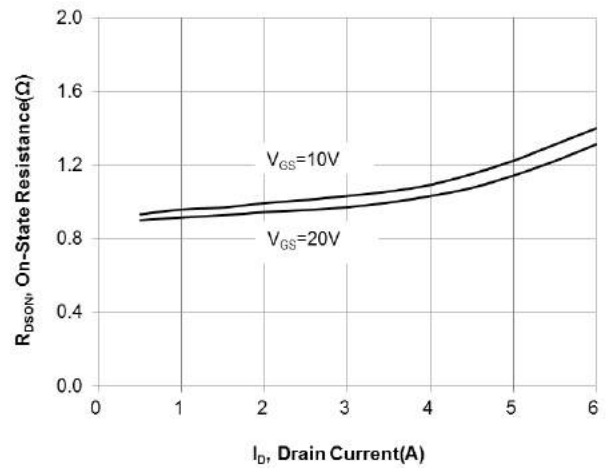


Fig 4. Drain-source on-state resistance

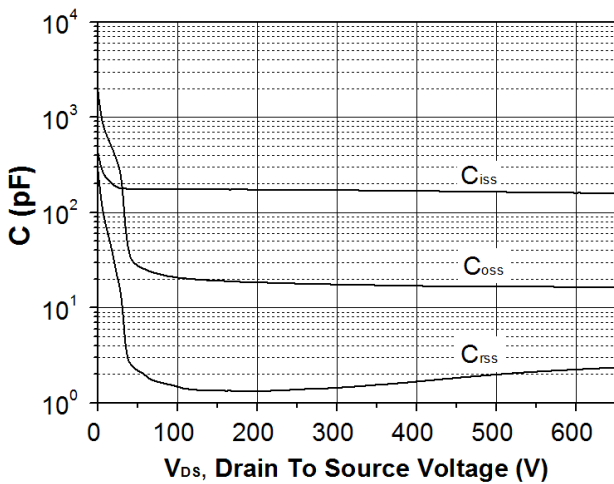


Fig 5. Capacitance Characteristics

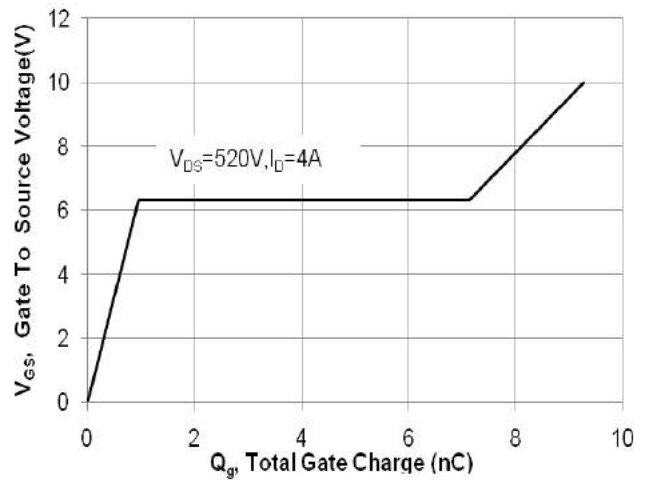


Fig 6. Gate charge characteristics

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

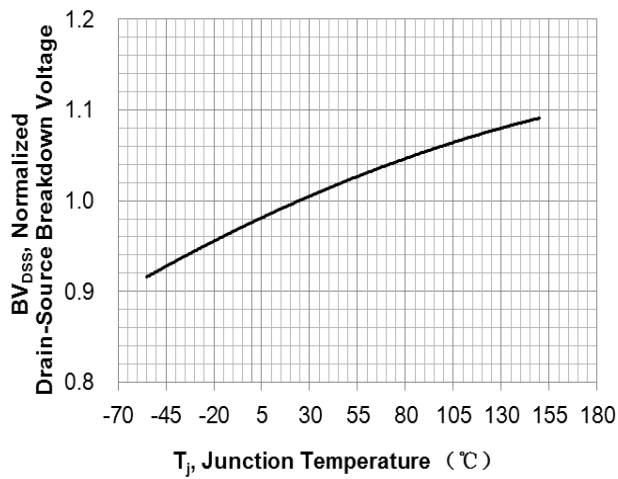


Fig 7. BV_{DSS} vs Junction Temperature

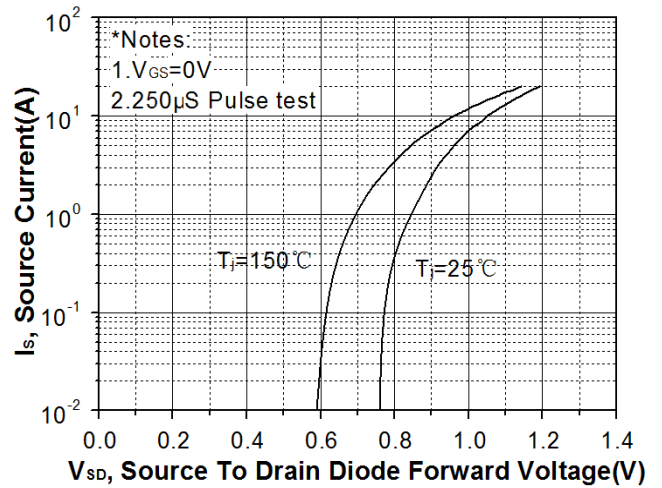


Fig 8. Forward characteristics of reverse diode

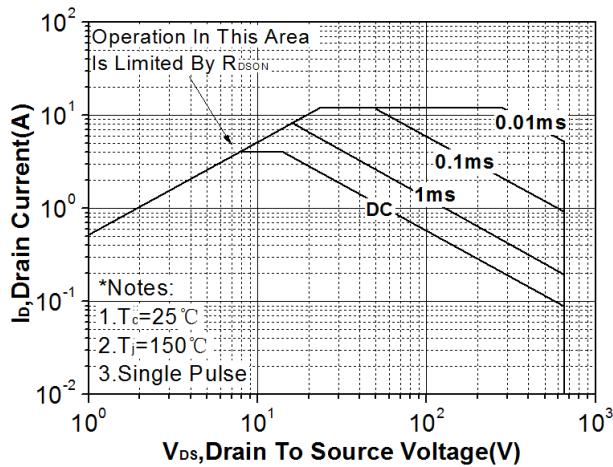


Fig 9. Safe operating area(TO-252)

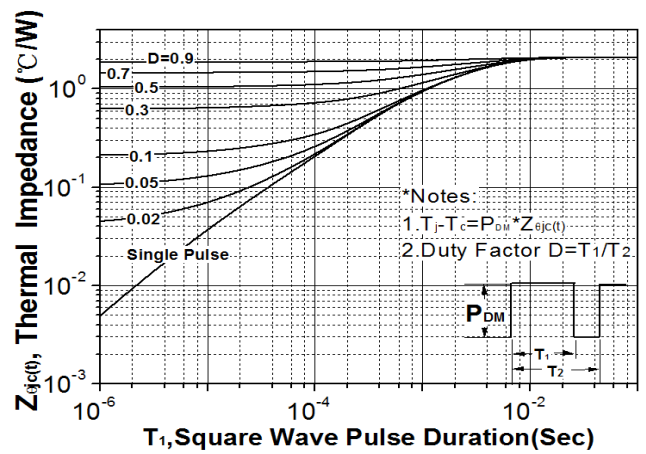


Fig 10. Transient thermal impedance (TO-252)

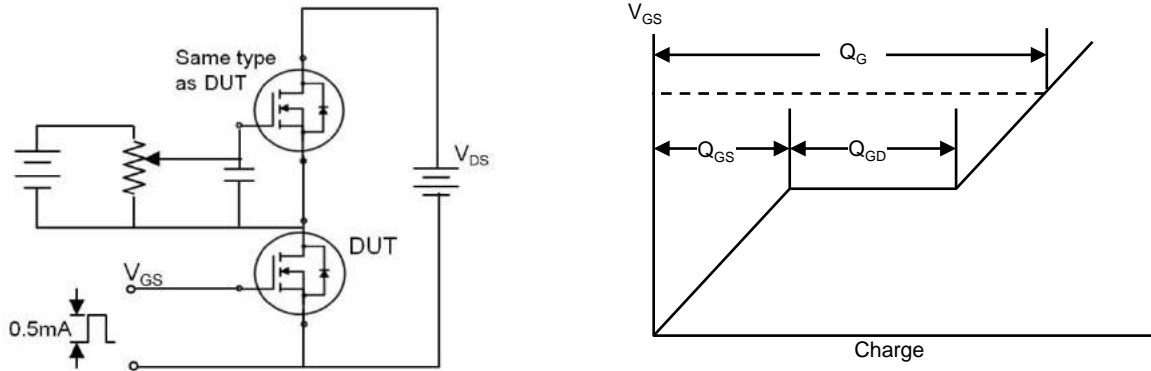


Fig A. Gate charge test circuit & waveform

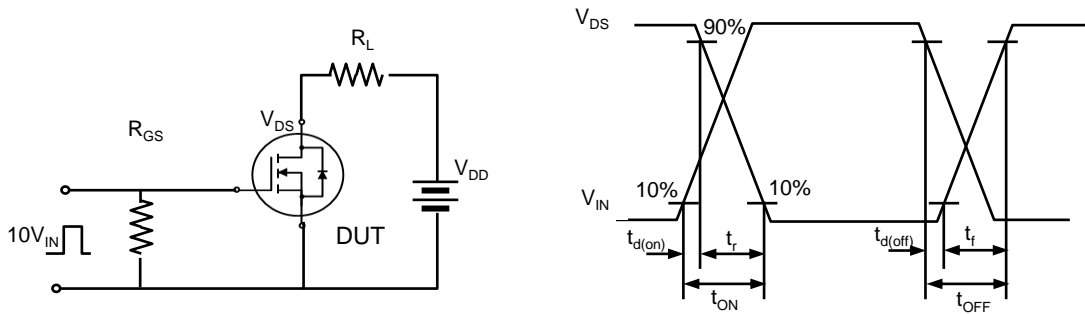


Fig B. Switching time test circuit & waveform

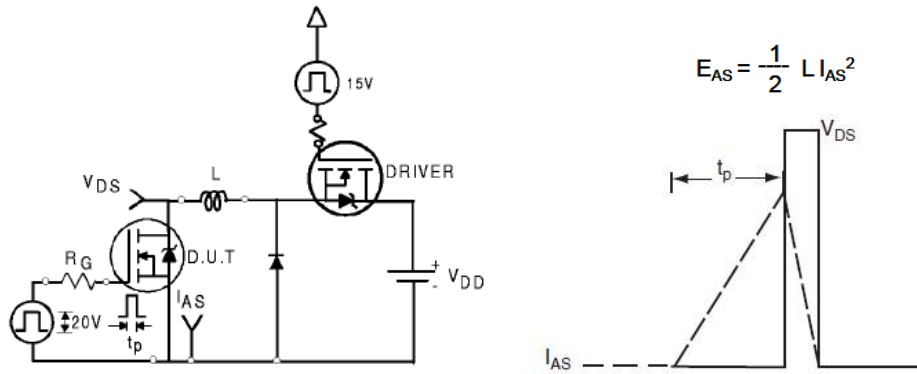


Fig C. Unclamped Inductive switching test circuit & waveform

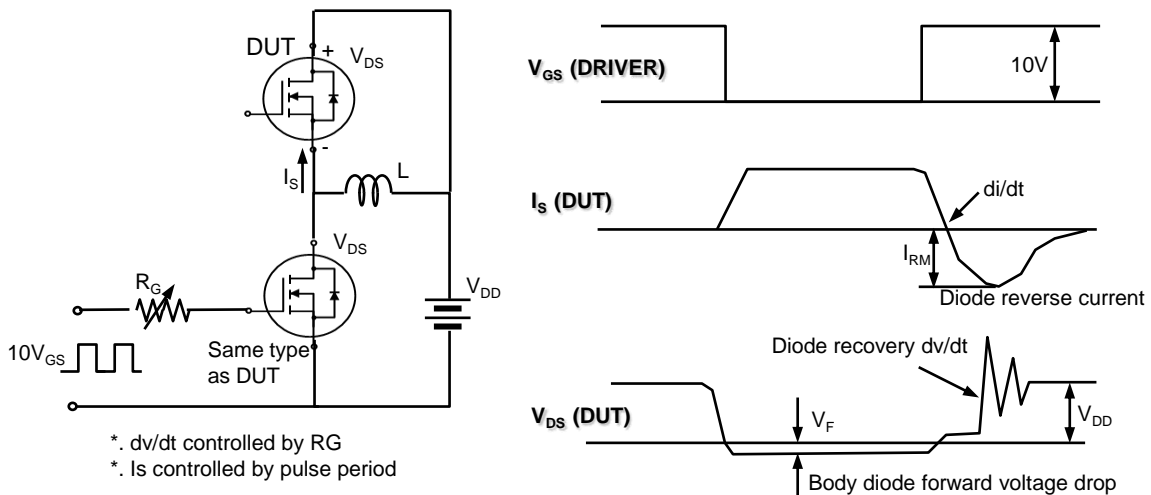
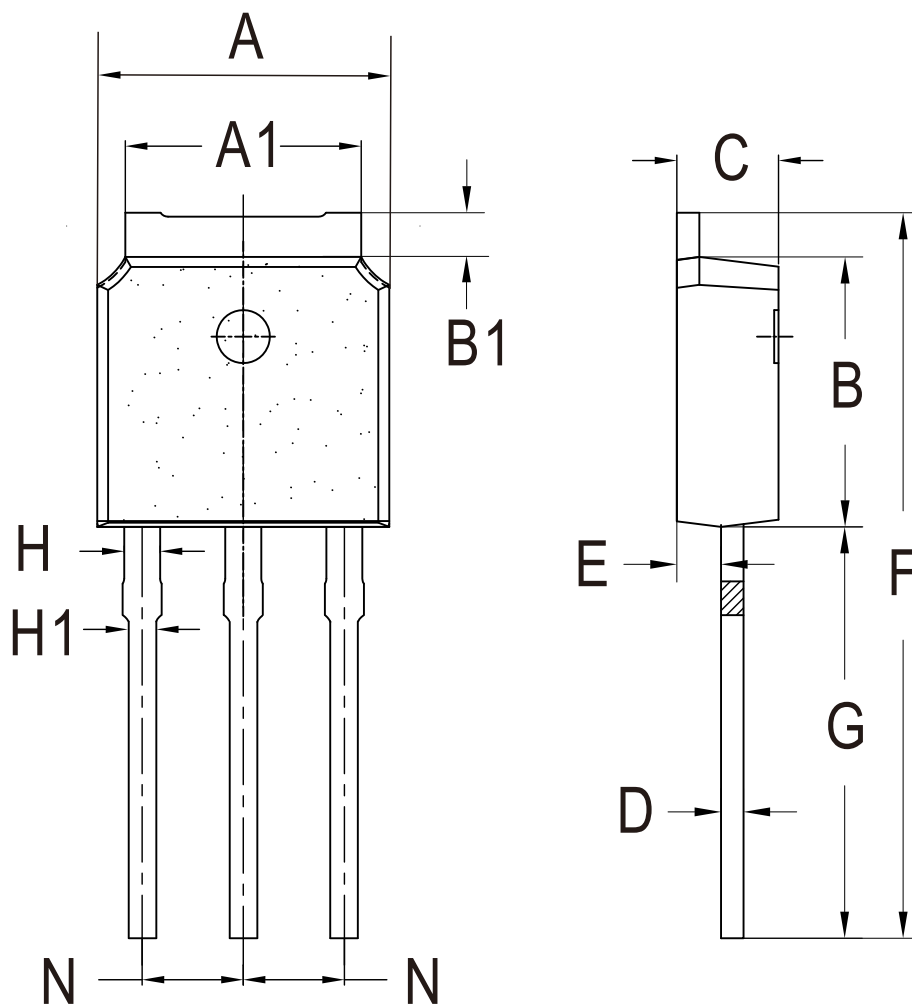


Fig D. Peak diode recovery dv/dt test circuit & waveform

TO-251-3L Package Information



Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	6.40	6.80	E	0.90	1.10
A1	5.20	5.50	F	16.10	16.70
B	5.90	6.30	G	9.20	9.60
B1	0.95	1.25	H	0.70	0.90
C	2.10	2.50	H1	0.50	0.70
D	0.40	0.60	N	2.20	2.40

Customer Service

Sales and Service:

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