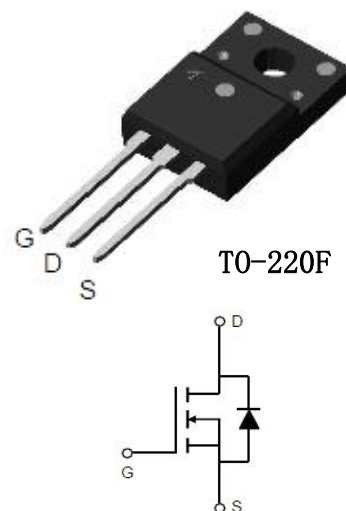


500V N-Channel POWER MOSFET

Features

- $V_{DSS}=500V$ $I_D=10A$
 $R_{DS(ON)}=0.75\Omega(\text{Max.})@V_{GS}=10V$
- High Reliability Capability with Passivation
- 100% avalanche tested
- RoHS compliant
- Smart design in high voltage technology.

PIN DESCRIPTION



Applications

- LED power supplies
- Cell Phone Charger
- Standby Power

Part Number	Package	Marking	ROHS Status	Packing
SI10N50F	TO-220F	SI10N50F	Pb-Free	Box (Tube)

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Typical	Unit
V_{DSS}	Drain-Source Voltage	500	V
V_{GSS}	Gate-Source Voltage	± 30	V
I_D	Drain Current	$T_C=25^\circ\text{C}$	10
		$T_C=100^\circ\text{C}$	6
I_{DM}	Pulsed Drain Current	33	A
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	50	W
I_{AR}	Avalanche Current	3.8	A
E_{AS}	Single Pulse Avalanche Energy	433	mJ
E_{AR}	Repetitive Avalanche Energy	216	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – Case.	$R_{\theta JC}$	2.5	$^\circ\text{C}/\text{W}$
Thermal resistance, junction – Ambient.	$R_{\theta JA}$	65	

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

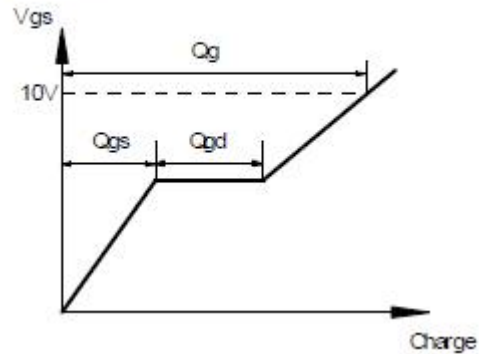
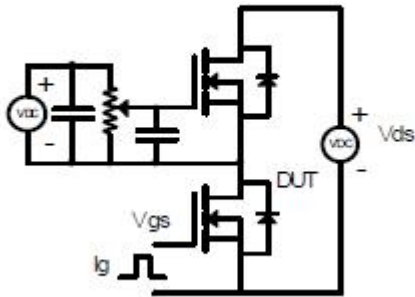
Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-source breakdown voltage	V _{GS} =0V, I _D =250uA	500	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V	-	-	1	uA
I _{GSS}	Gate-Source Leakage	V _{GS} =±30V, V _{DS} =0V	-	-	± 100	nA
V _{GS(th)}	Gate-Source Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2	-	4	V
R _{DS(on)}	Drain-Source On-Resistance	V _{GS} =10V, I _D =5A	-	-	0.75	Ω
g _{fs}	Forward Transconductance	V _{DS} =40V, I _D =5A	-	10	-	S
Dynamic Characteristic						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	1030	-	pF
C _{oss}	Output Capacitance		-	112	-	
C _{rss}	Reverse Transfer Capacitance		-	10	-	
Q _G	Gate Total Charge	V _{DS} =400V, I _D =10A, V _{GS} =10V,	-	26	-	nC
Q _{gs}	Gate-Source charge		-	4.8	-	
Q _{gd}	Gate-Drain charge		-	9.5	-	
t _{d(on)}	Turn-on delay time	V _{DD} =250V, I _D =10A, R _G =25Ω, V _{GS} =10V	-	24	-	nS
t _r	Rise time		-	65	-	
t _{d(off)}	Turn-off delay time		-	69	-	
t _f	Fall time		-	50	-	
Drain-Source Body Diode Characteristics						
V _{SD}	Body Diode Forward Voltage	V _{GS} =0V, I _F =1A	-	-	1.6	V
t _{rr}	Body Diode Reverse Recovery Time	V _{DS} =100V, I _F =10A , di _F /dt =100A/μs	-	-	190	nS
Q _{rr}	Body Diode Reverse Recovery Charge		-	-	0.6	uC
I _S	Maximum Continuous Drain-Source Diode Forward Current		-	-	10	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	33	A

Note:

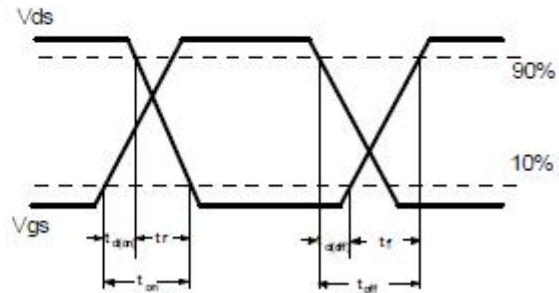
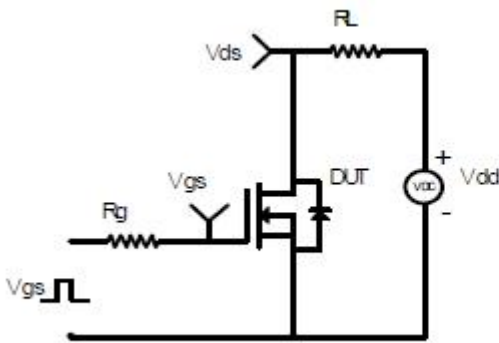
1. The value of R_{θJA} is measured with the device in a still air environment with T_A =25°C.
2. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 2% max

Switching Time Test Circuit and Wave forms

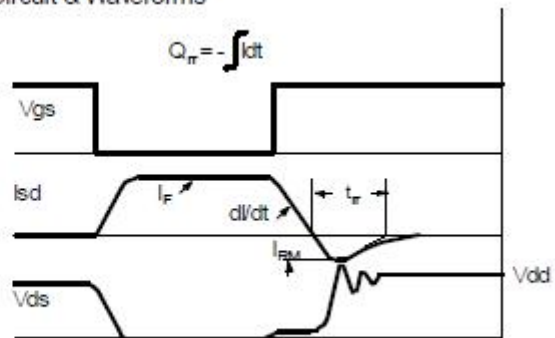
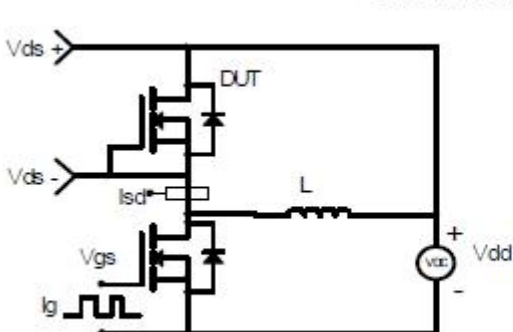
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

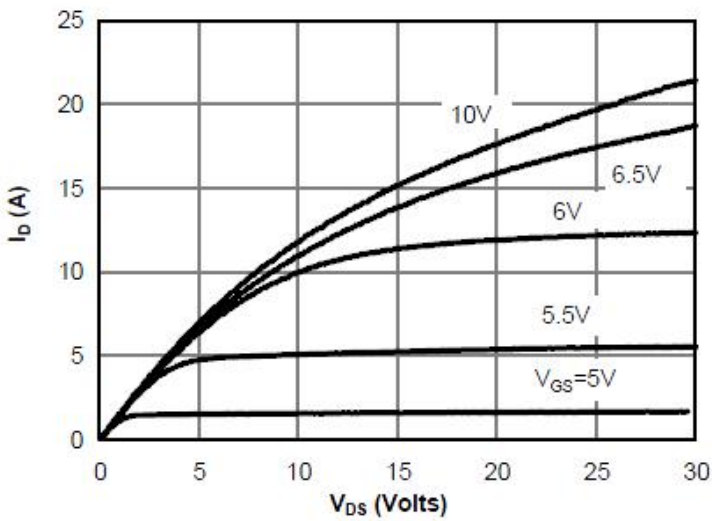


Fig 1: On-Region Characteristics

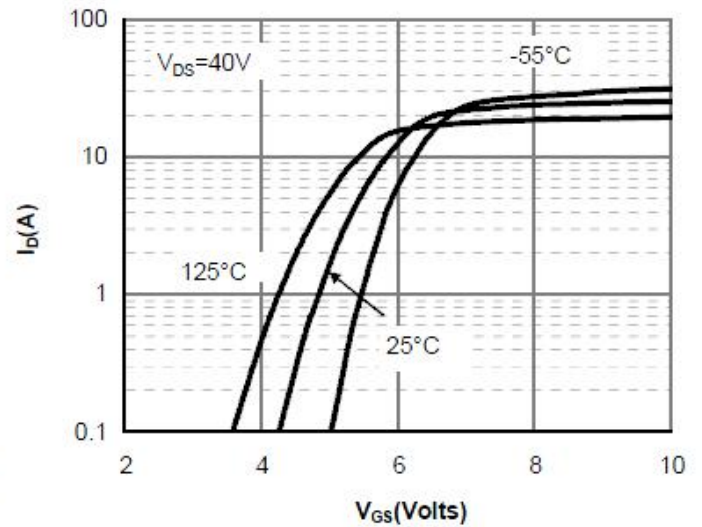


Figure 2: Transfer Characteristics

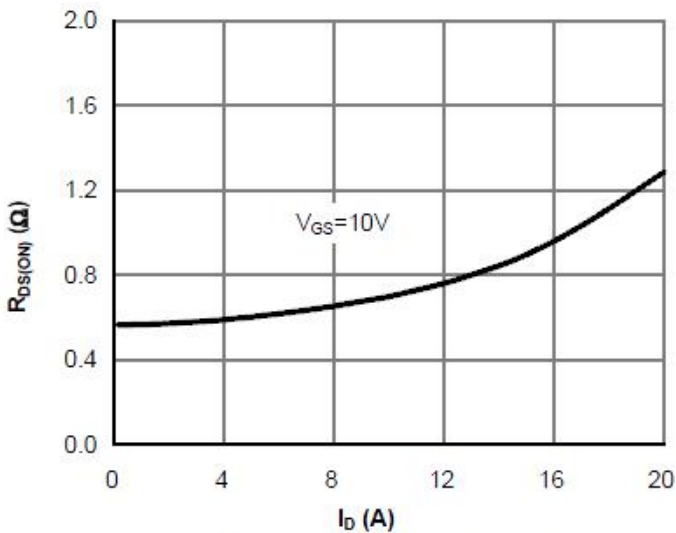


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

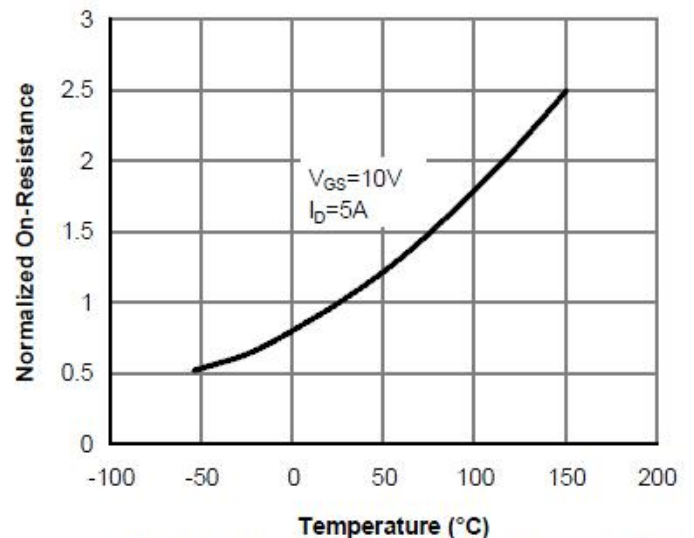


Figure 4: On-Resistance vs. Junction Temperature

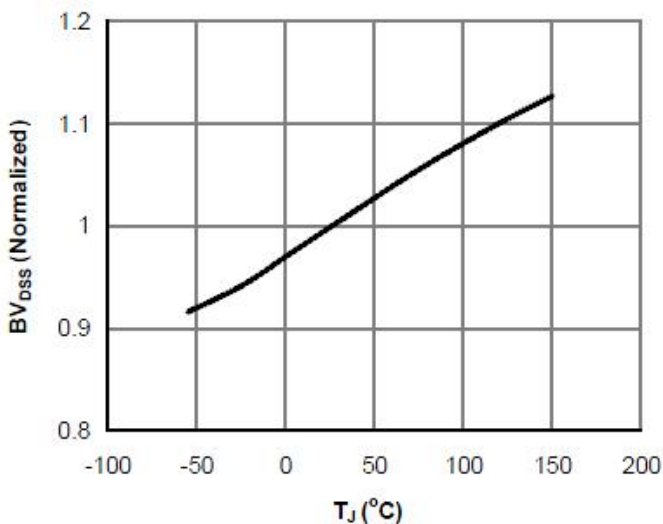


Figure 5: Break Down vs. Junction Temperature

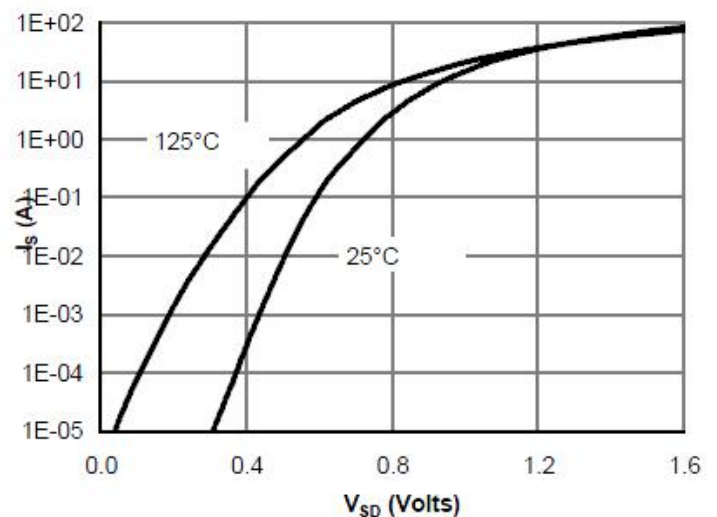
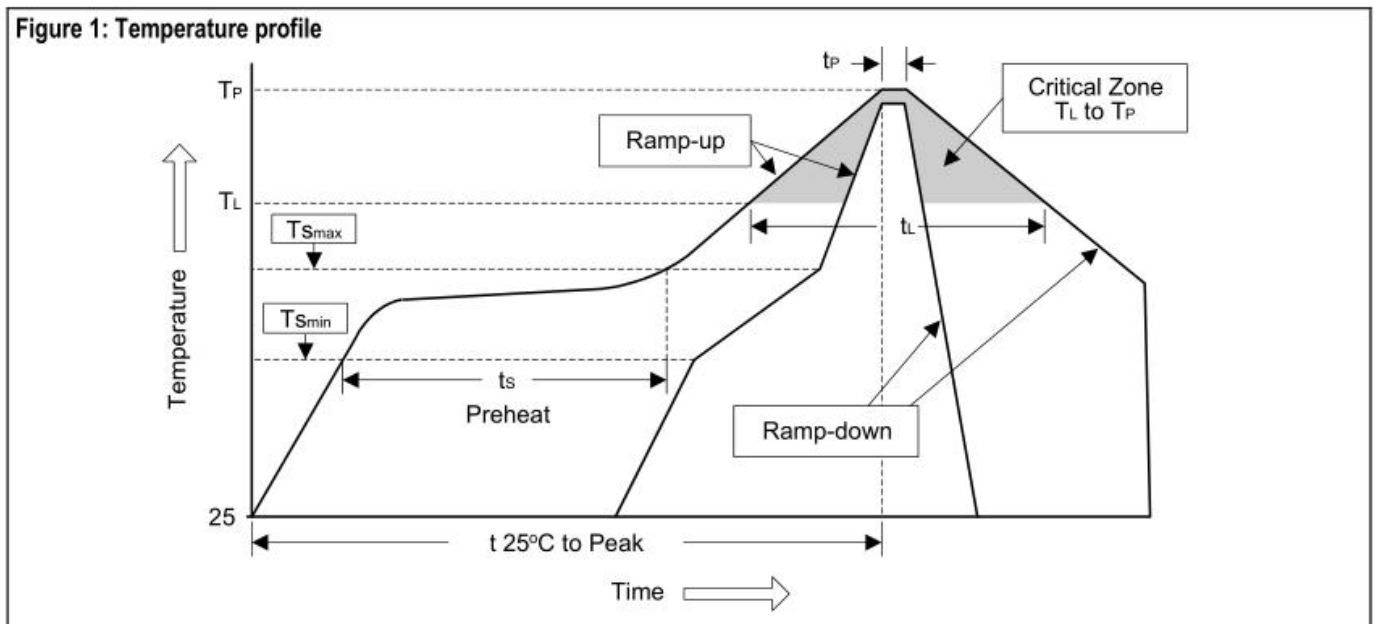


Figure 6: Body-Diode Characteristics (Note E)

Soldering Methods for Products

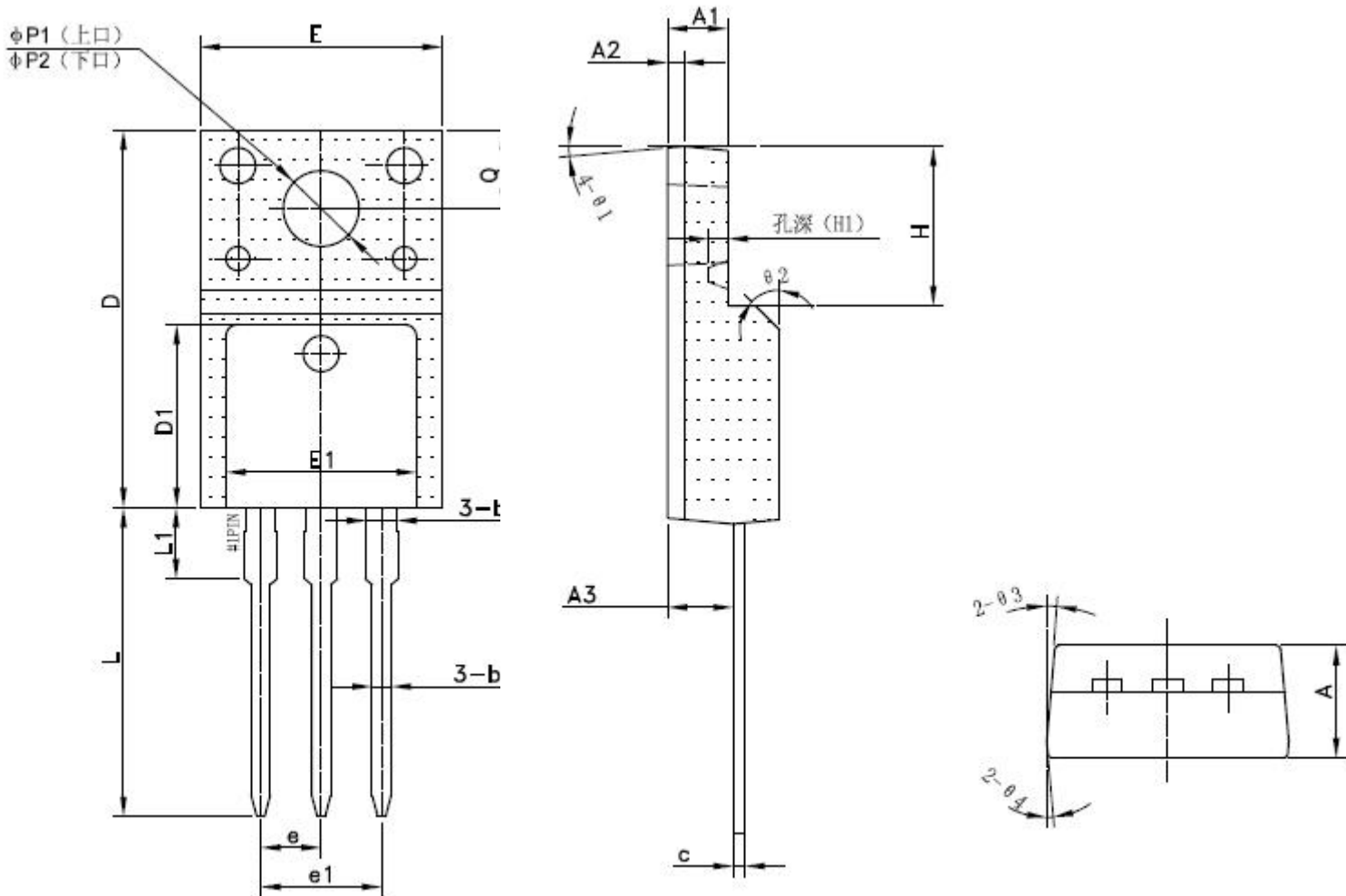
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(min to max)(ts)	60 to 120 sec	60 to 180 sec
Tsmax to TL		
- ramp-up rate	<3°C/sec	<3°C/sec
Time maintained above:		
-Temperature(TL)	183°C	217°C
-Time(tL)	60 to 150 sec	60 to 150 sec
Peak Temperature(Tp)	240°C+0/-5°C	250°C+0/-5°C
Time within 5°C of actual Peak Temperature	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25 °C to Peak Temperature	<6 minutes	<8 minutes



Note :1.Storage environment: Temperature=10°C to 35@Humidity=45%±15%

- 2.Reflow soldering of surface-mount devices
- 3.Flow(wave) soldering(solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices	245°C±5°C	5sec±1sec
Pb-free devices	250°C+0/-5°C	5sec±1sec

Package Outline


Millimeter(mm)					
Symbol	Min	Max	Symbol	Min	Max
A	4.50	4.90	E	9.96	10.36
A1	2.44	2.64	E1	8.00TYP	
A2	0.60	0.80	e	2.54TYP	
A3	2.56	2.96	e1	5.08TYP	
b	0.70	0.95	H	6.50	6.90
b1	1.28TYP		L	12.48	13.20
c	0.45	0.65	L1	2.93TYP	
D	15.67	16.07	P1	2.98	3.38
D1	7.70TYP		P2	3.20	3.60

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