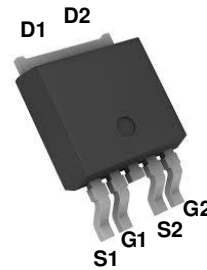
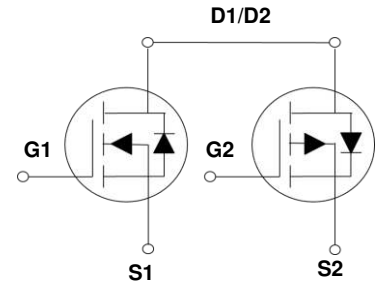


### Main Product Characteristics

$BV_{DSS}$	60V	-60V
$R_{DS(ON)}$	30m $\Omega$	48m $\Omega$
$I_D$	19A	-17A



TO-252-4L



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The GSFD06C20 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	N-Ch	P-Ch	Unit
Drain-Source Voltage	$V_{DS}$	60	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Drain Current-Continuous( $T_C=25^\circ\text{C}$ )	$I_D$	19	-17	A
Drain Current-Continuous( $T_C=100^\circ\text{C}$ )		12	-10.7	A
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	76	68	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	26.4	54.4	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	23	33	A
Power Dissipation( $T_C=25^\circ\text{C}$ )	$P_D$	20.1		W
Power Dissipation-Derate Above $25^\circ\text{C}$		0.16		W/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	6.2		$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62		$^\circ\text{C}/\text{W}$
Storage Temperature Range	$T_{STG}$	-55 To +150		$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-55 To +150		$^\circ\text{C}$

### N-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	-	-	V
BV <sub>DSS</sub> Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Reference to 25°C, I <sub>D</sub> =1mA	-	0.07	-	V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	-	-	1	μA
		V <sub>DS</sub> =48V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	-	-	10	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =15A	-	25	30	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	28	36	
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> ,	1.2	1.6	2.5	V
V <sub>GS(th)</sub> Temperature Coefficient	ΔV <sub>GS(th)</sub>	I <sub>D</sub> =250μA	-	-4.6	-	mV/°C
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =3A	-	10	-	S
<b>Dynamic and Switching Characteristics</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, F=1.0MHz	-	1180	1720	pF
Output Capacitance	C <sub>OSS</sub>		-	68	100	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	45	70	
Turn-On Delay Time <sup>3,4</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> =30V, R <sub>G</sub> =6Ω V <sub>GS</sub> =10V, I <sub>D</sub> =1A	-	4.6	9	nS
Rise Time <sup>3,4</sup>	t <sub>r</sub>		-	14.8	28	
Turn-Off Delay Time <sup>3,4</sup>	t <sub>d(off)</sub>		-	27.2	52	
Fall Time <sup>3,4</sup>	t <sub>f</sub>		-	7.8	15	
Total Gate Charge <sup>3,4</sup>	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	-	16.6	24	nC
Gate-Source Charge <sup>3,4</sup>	Q <sub>gs</sub>		-	2.2	4.4	
Gate-Drain Charge <sup>3,4</sup>	Q <sub>gd</sub>		-	3.9	8	
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	-	2.1	4.2	Ω
<b>Drain-Source Diode Characteristics</b>						
Continuous Source Current	I <sub>S</sub>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	-	-	19	A
Pulsed Source Current	I <sub>SM</sub>		-	-	38	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	-	-	1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, N-CH I<sub>AS</sub>=23A., P-CH I<sub>AS</sub>=33A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
4. Essentially independent of operating temperature.

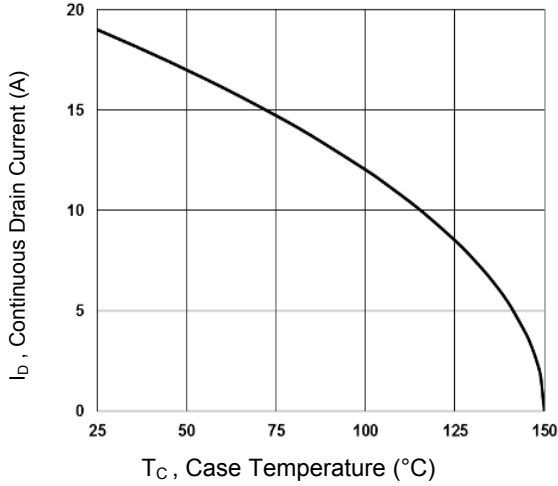
### P-Channel Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
$BV_{DSS}$ Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=-1mA$	-	-0.05	-	$V/^\circ\text{C}$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-60V,$ $V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	-1	$\mu A$
		$V_{DS}=-48V,$ $V_{GS}=0V, T_J=125^\circ\text{C}$	-	-	-10	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-15A$	-	40	48	m $\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	-	53	68	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS},$ $I_D=-250\mu A$	-1.2	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$		-	5	-	$mV/^\circ\text{C}$
Forward Transconductance	$g_{FS}$	$V_{DS}=-10V, I_D=-3A$	-	10	-	S
<b>Dynamic and Switching Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-30V,$ $V_{GS}=0V, F=1MHz$	-	1250	1810	pF
Output Capacitance	$C_{oss}$		-	85	125	
Reverse Transfer Capacitance	$C_{rss}$		-	65	95	
Turn-On Delay Time <sup>2,3</sup>	$t_{d(on)}$	$V_{DD}=-30V,$ $R_G=6\Omega$ $V_{GS}=-10V, I_D=-1A$	-	13	25	nS
Rise Time <sup>2,3</sup>	$t_r$		-	42.4	81	
Turn-Off Delay Time <sup>2,3</sup>	$t_{d(off)}$		-	64.6	123	
Fall Time <sup>2,3</sup>	$t_f$		-	16.4	31	
Total Gate Charge <sup>2,3</sup>	$Q_g$	$V_{DS}=-30V, I_D=-8A,$ $V_{GS}=-10V$	-	22.4	31	nC
Gate-Source Charge <sup>2,3</sup>	$Q_{gs}$		-	4.1	6	
Gate-Drain Charge <sup>2,3</sup>	$Q_{gd}$		-	5.2	7	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	15	30	$\Omega$
<b>Drain-Source Diode Characteristics</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V,$ Force Current	-	-	-17	A
Pulsed Source Current	$I_{SM}$		-	-	-34	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V,$ $I_S=-1A, T_J=25^\circ\text{C}$	-	-	-1	V

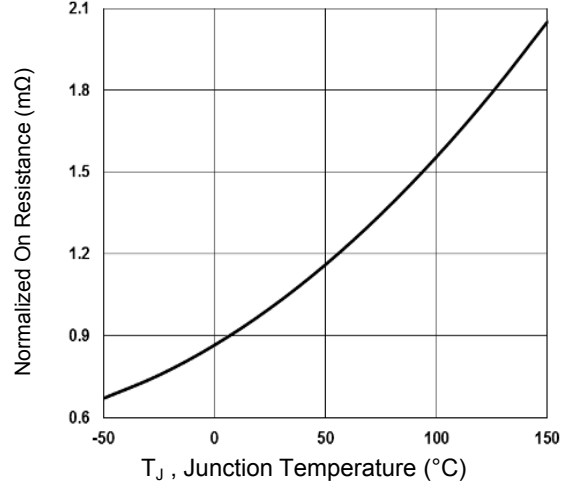
Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

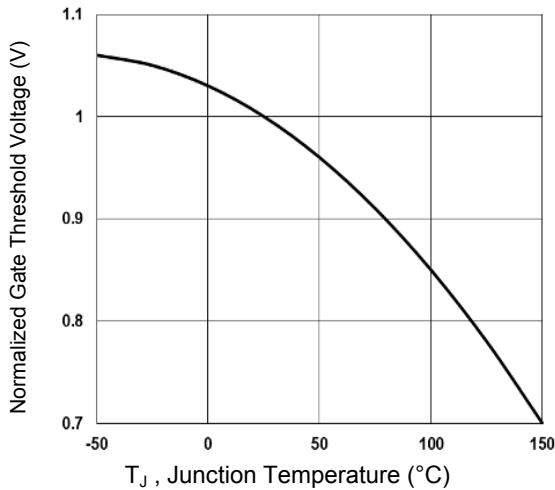
### N-Channel Typical Electrical and Thermal Characteristic Curves



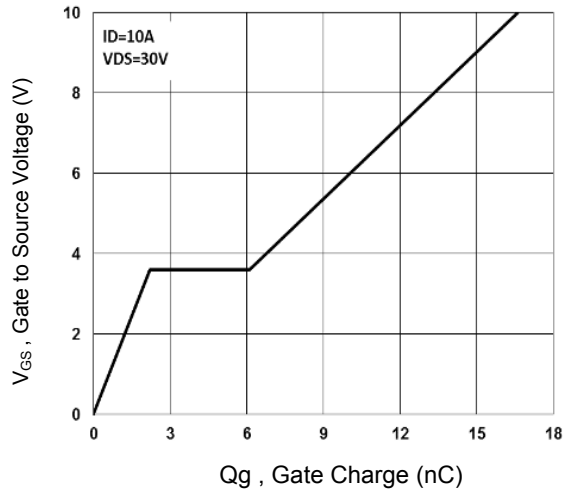
**Figure 1. Continuous Drain Current vs.  $T_C$**



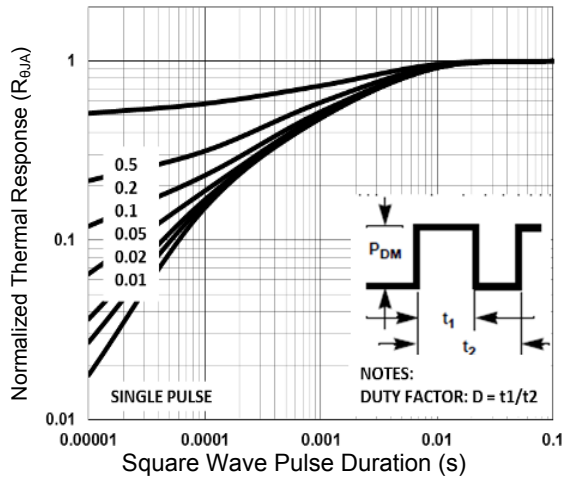
**Figure 2. Normalized  $R_{DS(on)}$  vs.  $T_J$**



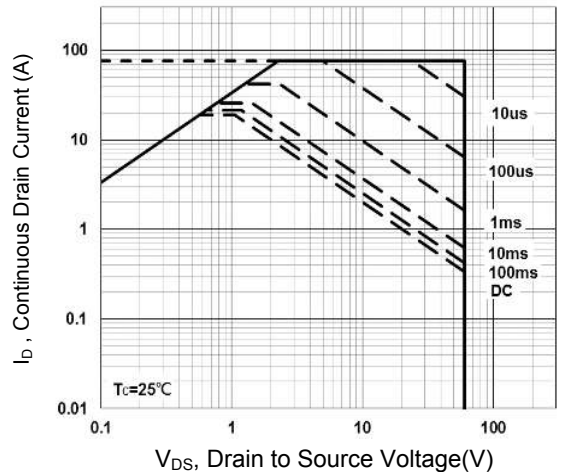
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Waveform**

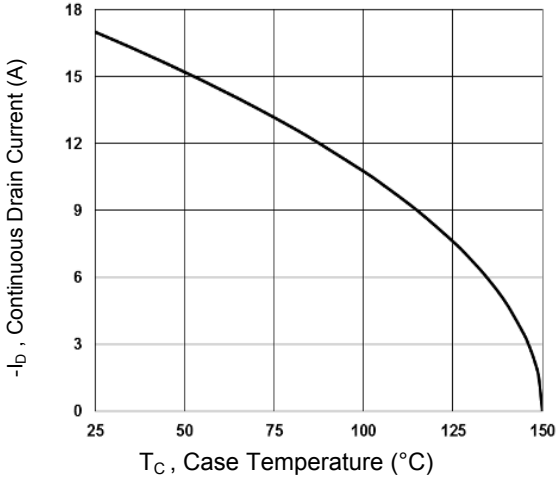


**Figure 5. Normalized Transient Impedance**

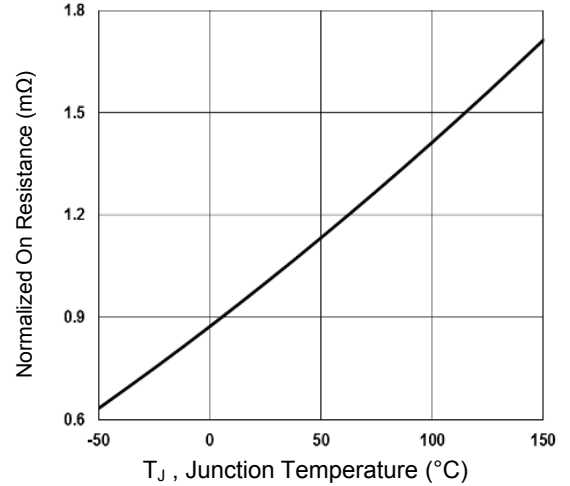


**Figure 6. Maximum Safe Operation Area**

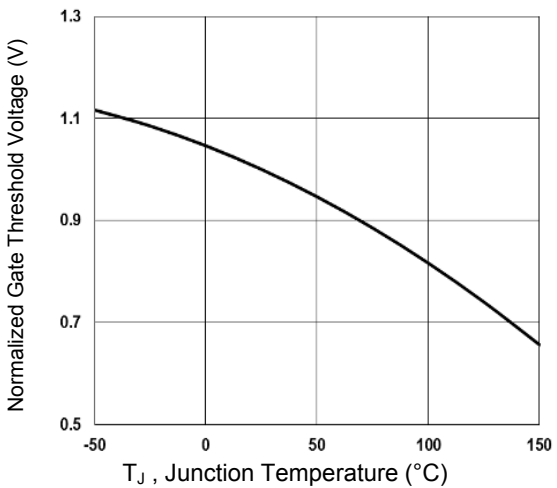
**P-Channel Typical Electrical and Thermal Characteristic Curves**



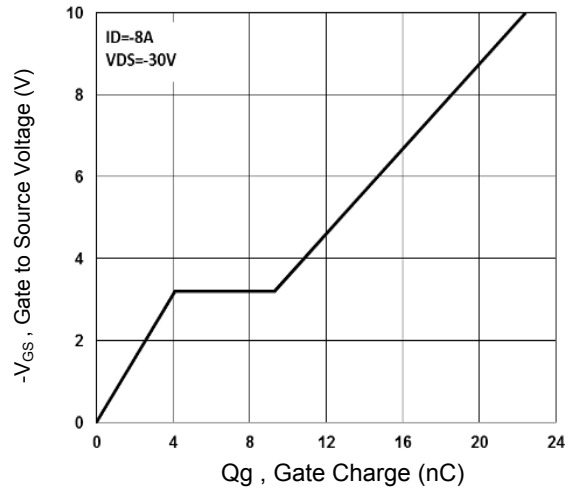
**Figure 7. Continuous Drain Current vs.  $T_c$**



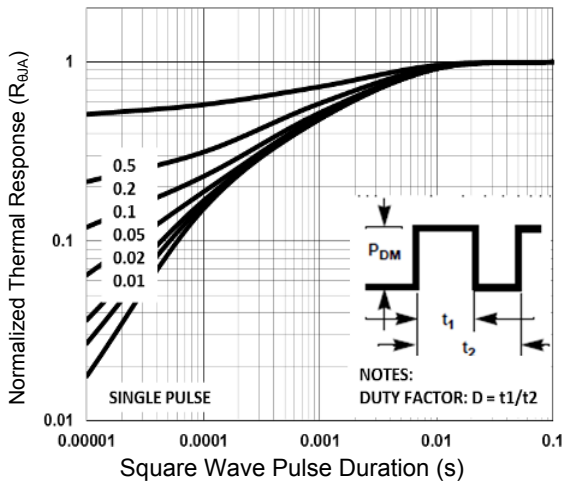
**Figure 8. Normalized  $R_{DS(on)}$  vs.  $T_j$**



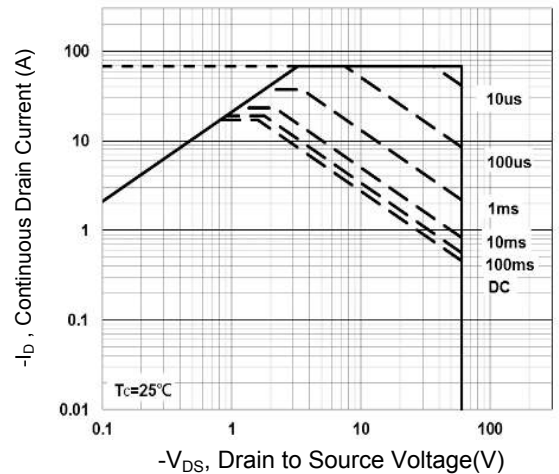
**Figure 9. Normalized  $V_{th}$  vs.  $T_j$**



**Figure 10. Gate Charge Waveform**

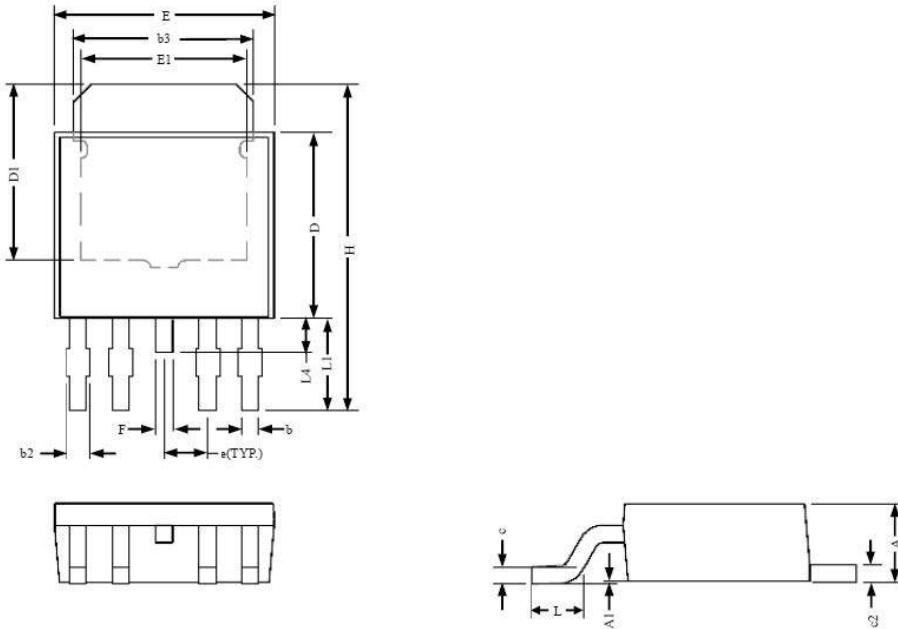


**Figure 11. Normalized Transient Impedance**



**Figure 12. Maximum Safe Operation Area**

**Package Outline Dimensions (TO-252-4L)**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.400	2.200	0.094	0.087
A1	0.150	0.000	0.006	0.000
B	0.600	0.400	0.024	0.016
b2	0.800	0.500	0.031	0.020
b3	5.500	5.200	0.217	0.205
C	0.508typ.		0.02typ.	
c2	0.550	0.450	0.022	0.018
D	5.800	5.400	0.228	0.213
D1	---	4.570	---	0.180
E	6.800	6.400	0.268	0.252
E1	---	3.810	---	0.150
E	1.27ref.		0.05ref.	
F	0.600	0.400	0.024	0.016
H	10.200	9.400	0.402	0.370
L	1.770	1.400	0.070	0.055
L1	3.000	2.400	0.118	0.094
L4	1.200	0.800	0.047	0.031