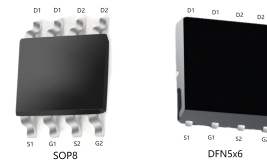


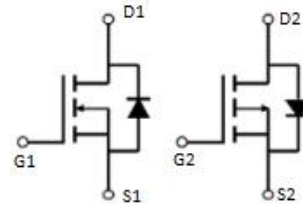
## Features

- N+P Channel
- Very Low on-resistance



## Applications

- Motor Control.
- Synchronous Rectification.



## Absolute Ratings (T<sub>c</sub>=25°C)

Parameter	Symbol	Value		Unit	
		NMOS	PMOS		
Drain-Source Voltage	V <sub>DSS</sub>	80	-80	V	
Drain Current-continuous	I <sub>D</sub>	T <sub>C</sub> =25°C	3.4	-2.6	A
		T <sub>C</sub> =100°C	1.7	-1.3	A
Drain Current-pulse (note 1)	I <sub>DM</sub>	13.6	-10.4	A	
Gate-Source Voltage	V <sub>GS</sub>	±20	±20	V	
Avalanche Current, single pulse(L=0.5mH)	I <sub>AS</sub>	5.4	-4.2	A	
Avalanche Energy, single pulse(L=0.5mH)	E <sub>AS</sub>	7.29	4.41	mJ	
Power Dissipation (SOP-8)	P <sub>D</sub>	T <sub>C</sub> =25°C	2.0	W	
		T <sub>C</sub> =100°C	1.4	W	
Power Dissipation (DFN5x6)	P <sub>D</sub>	T <sub>C</sub> =25°C	2.8	W	
		T <sub>C</sub> =100°C	1.1	W	
Maximum Junction Temperature	T <sub>J</sub>	150		°C	
Storage Temperature Range	T <sub>STG</sub>	-55 ~ 150		°C	

\*Drain current limited by maximum junction temperature

## N-Channel Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Drain-Source Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	80	-	-	V

Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	1	$\mu A$
		$V_{DS}=80V, T_C=85^\circ C$	-	-	30	$\mu A$
Gate body leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 10$	$\mu A$
<b>On-Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	2	3	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.4A,$ $T_C=25^\circ C$	-	130	-	m $\Omega$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=4.5V, I_D=1.7A,$ $T_C=25^\circ C$	-	134	-	m $\Omega$
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=20V, V_{GS}=0V,$ $f=1.0MHz$	-	1300	-	pF
Output capacitance	$C_{oss}$		-	200	-	pF
Reverse transfer capacitance	$C_{rss}$		-	40	-	pF
Gate Resistance	$R_G$	$V_{DS}=0V, V_{GS}=0V,$ $f=1.0MHz$	-	2.5	-	$\Omega$
Forward Transfer Admittance	$g_{fs}$	$V_{DS} = 10V, I_D = 3.4A$	3.0	-	-	S

**Electrical Characteristics**( $T_{CASE}=25^\circ C$  unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
<b>Switching-Characteristics</b>						
Turn-On delay time	$t_{d(on)}$	$V_{DD}=20V,$ $I_D=1.7A,$ $R_L=20\Omega$ $R_G=6\Omega$ $V_{GEN}=10V$	-	7.8	-	ns
Turn-On rise time	$t_r$		-	6.9	-	ns
Turn-Off delay time	$t_{d(Off)}$		-	22.4	-	ns
Turn-Off rise time	$t_f$		-	4.8	-	ns
Total Gate Charge	$Q_g$	$V_{DS}=40V, I_D=3.4A,$ $V_{GS}=5V$	-	6.6	-	nC
Gate-Source charge	$Q_{gs}$		-	1.8	-	nC
Gate-Drain charge	$Q_{gd}$		-	2.2	-	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1.7A$	-	0.78	1.1	V

Reverse Recovery Time	$T_{rr}$	$I_{DS}=1.7A,$ $disd/dt=100A/us$	13		ns
Reverse Recovery Charge	$Q_{rr}$		8.7		nC

### P-Channel Electrical Characteristics

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
Drain-Source Voltage	$BV_{DSS}$	$I_D=-250\mu A, V_{GS}=0V$	-80	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-80V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	-1	$\mu A$
		$V_{DS}=-80V, T_C=85^\circ C$	-	-	-30	$\mu A$
Gate body leakage current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
<b>On-Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-2	-3	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-2.6A,$ $T_C=25^\circ C$	-	258	-	m $\Omega$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-1.3A,$ $T_C=25^\circ C$	-	290	-	m $\Omega$
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{iss}$	$V_{DS}=-25V, V_{GS}=0V,$ $f=1.0MHz$	-	1419	-	pF
Output capacitance	$C_{oss}$		-	230	-	pF
Reverse transfer capacitance	$C_{rss}$		-	45	-	pF
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}=0V,$ $F=1MHz$	-	8	-	$\Omega$
Forward Transfer Admittance	$g_{fs}$	$V_{DS}=-10V, I_D=-2.6A$	2.0			S

### Electrical Characteristics( $T_{CASE}=25^\circ C$ unless otherwise specified)

Parameter	Symbol	Tests conditions	Min	Type	Max	Units
<b>Switching-Characteristics</b>						
Turn-On delay time	$t_{d(on)}$	$V_{DD}=-40V,$ $I_{DS}=-1.3A,$ $R_G=6\Omega$ $V_{GEN}=-10V$ $R_L=20\Omega$	-	8.7	-	ns
Turn-On rise time	$t_r$		-	7	-	ns
Turn-Off delay time	$t_{d(off)}$		-	31	-	ns
Turn-Off rise time	$t_f$		-	17	-	ns

Total Gate Charge	$Q_g$	$V_{DS}=-40V, I_D=-2.6A,$ $V_{GS}=-5.0V$	-	8.2	-	nC
Gate-Source charge	$Q_{gs}$		-	2.5	-	nC
Gate-Drain charge	$Q_{gd}$		-	2.5	-	nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-1.3A$	-	-	-1.2	V
Reverse Recovery time	$T_{rr}$	$I_S=-2.6A,$ $di_{sd}/dt=100A/us$	-	15	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	8	-	nC

### Thermal Characteristic

Parameter	Symbol	Value		Unit
		SOP8	DFN5x6	
Thermal Resistance, Junction to Ambient	$R_{th}(J-A)^2$	62.5	45	$^{\circ}C/W$
	$R_{th}(J-A)^3$	89.2	68.5	$^{\circ}C/W$

Notes:

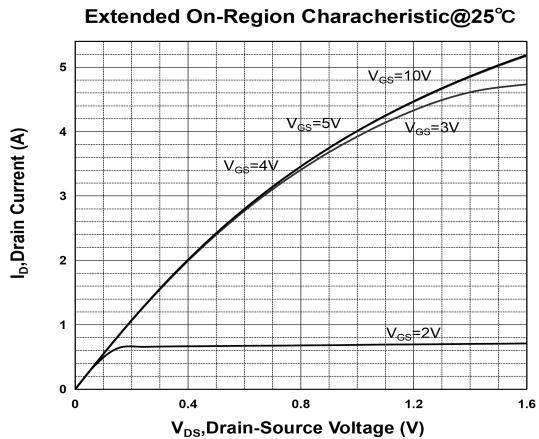
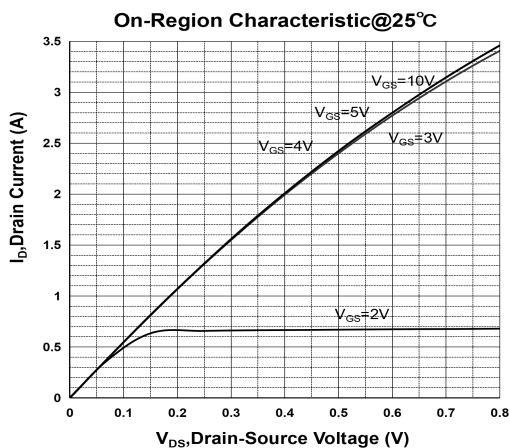
1. Pulse width limited by maximum junction temperature
2. Mounted on a ceramic board (30×30×0.8mm)
3. Mounted on a Cu board (40×40×0.8mm)

### Order Message

Marking	Package
MSPN0308S0	SOP8
MSPN0308N2	DFN 5x6

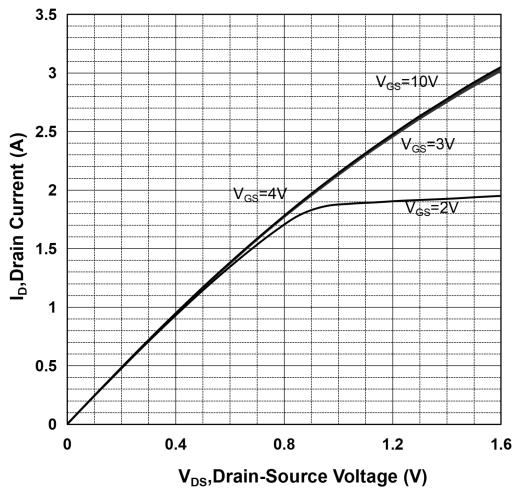
## ELECTRICAL CHARACTERISTICS (curves)

### N-Channel

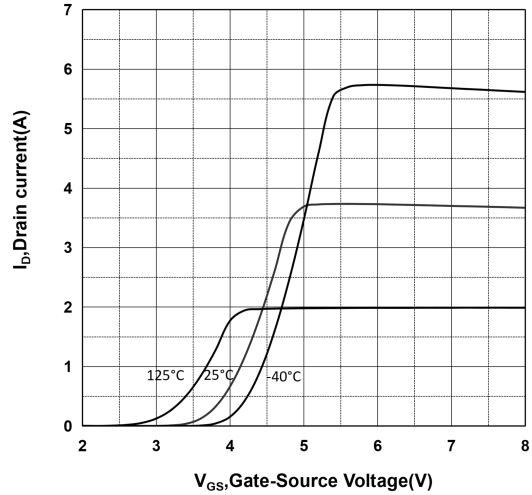




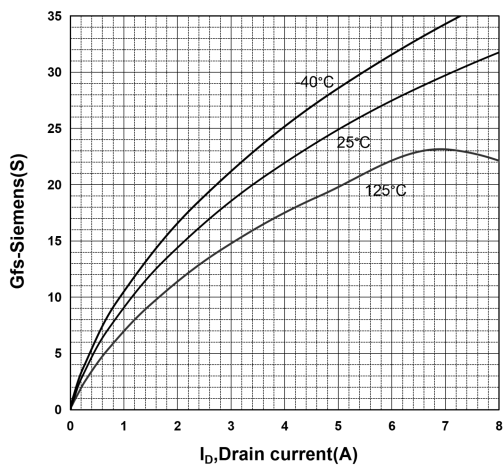
**On-Region Characteristic@125°C**



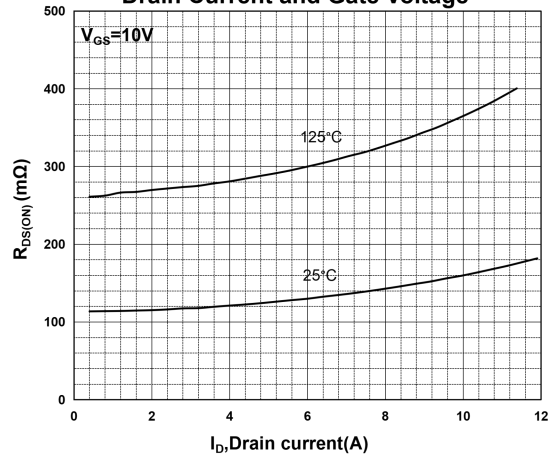
**Transfer Characteristics**



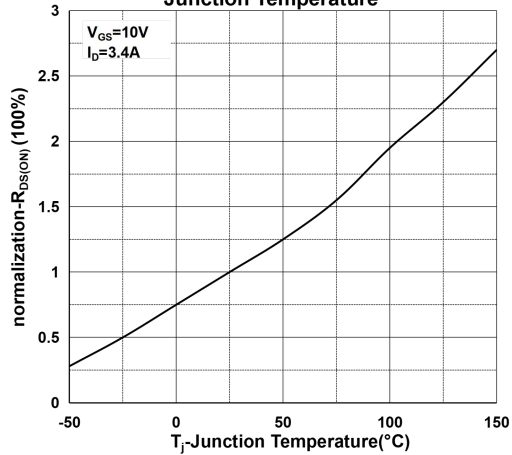
**Transconductance**



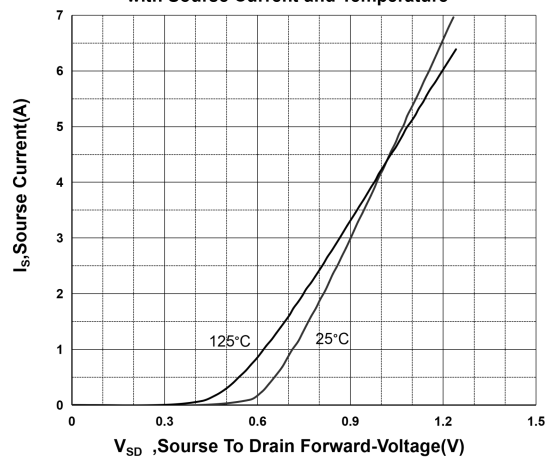
**On-Resistance Variation vs Drain Current and Gate Voltage**

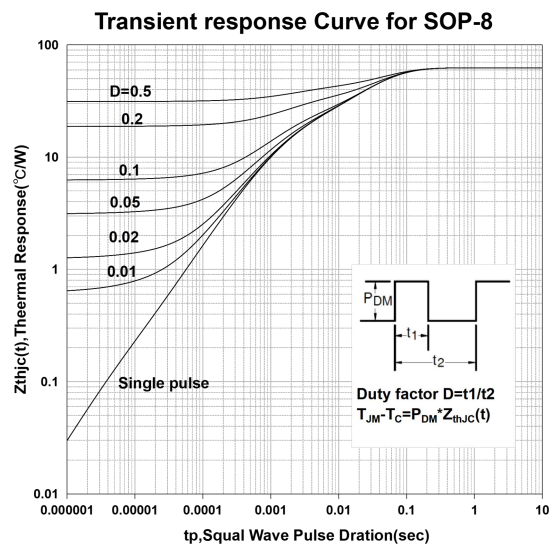
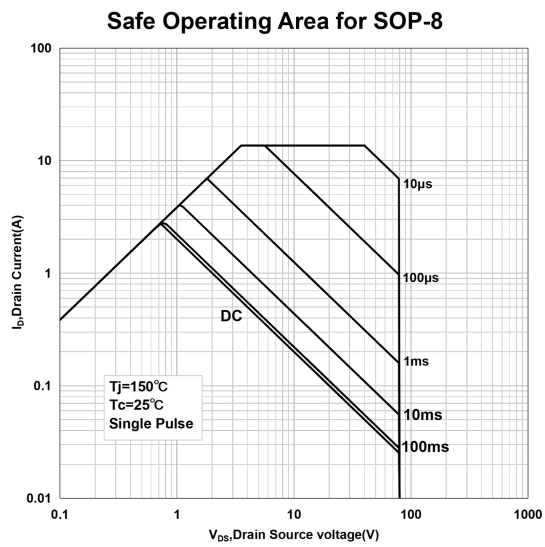
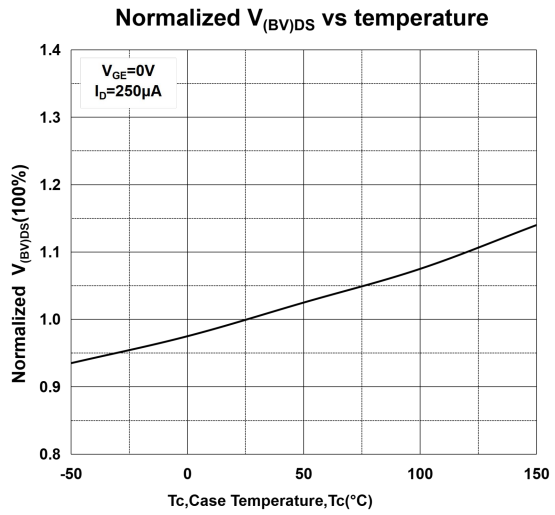
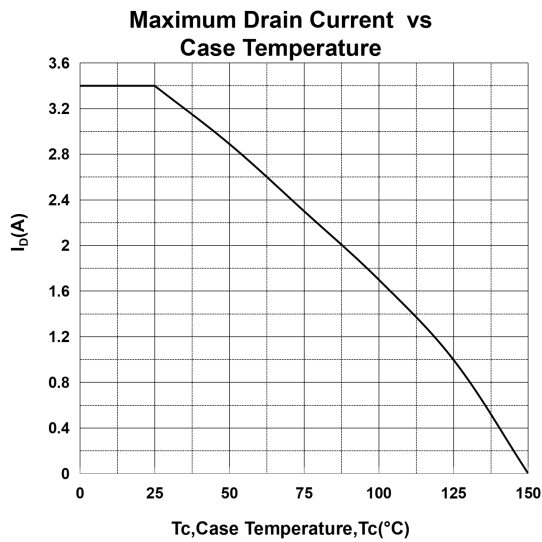
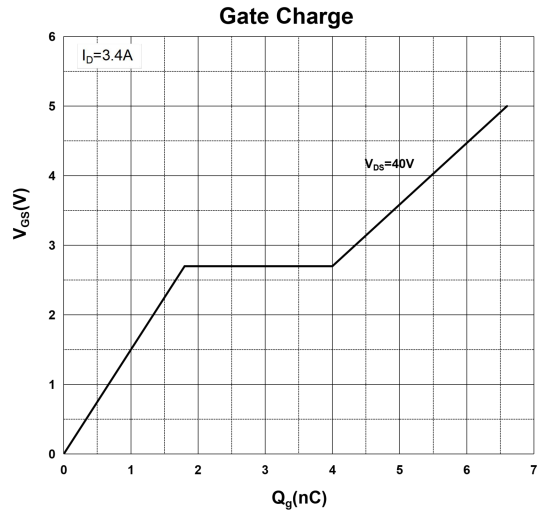
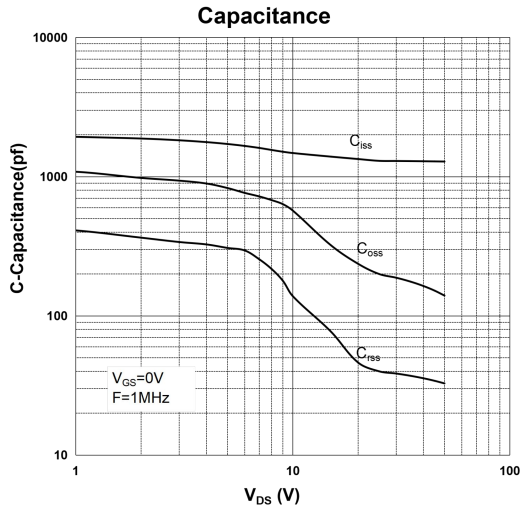


**Normalization On-Resistance Variation vs Junction Temperature**

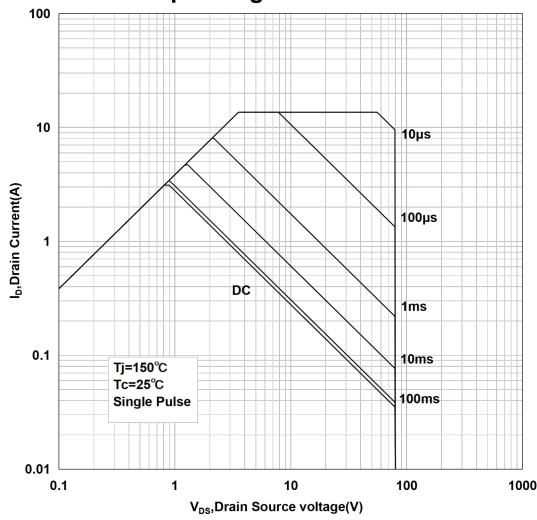


**Body Diode Forward Voltage Variation with Source Current and Temperature**

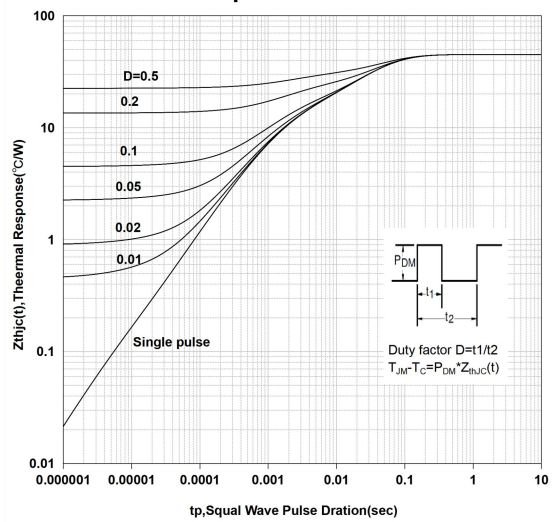




Safe Operating Area for DFN5x6

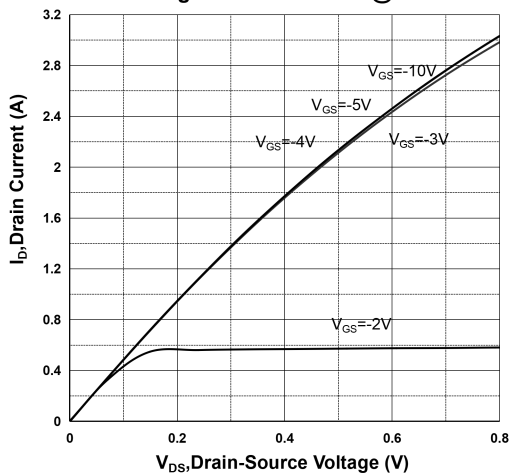


Transient response Curve for DFN5x6

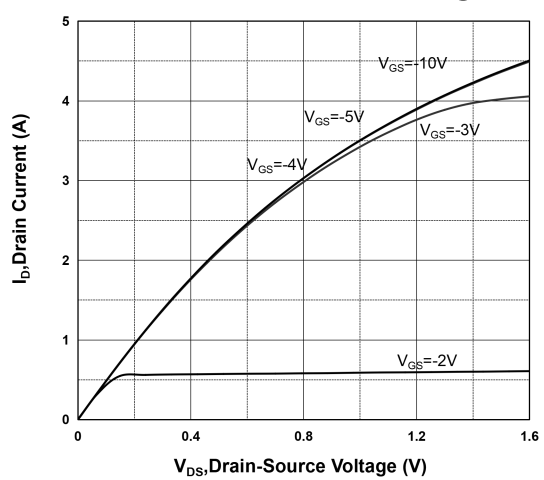


## P-Channel

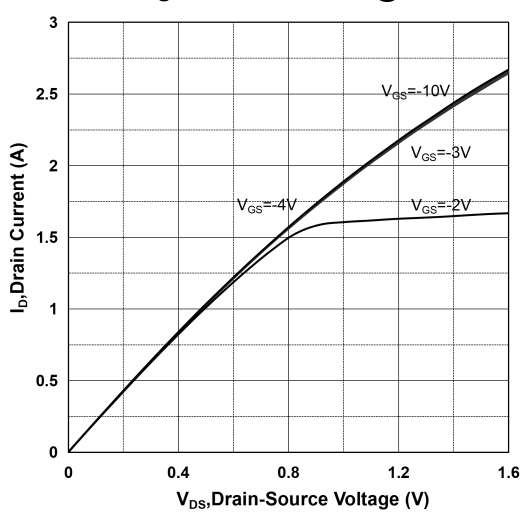
On-Region Characteristic@25°C



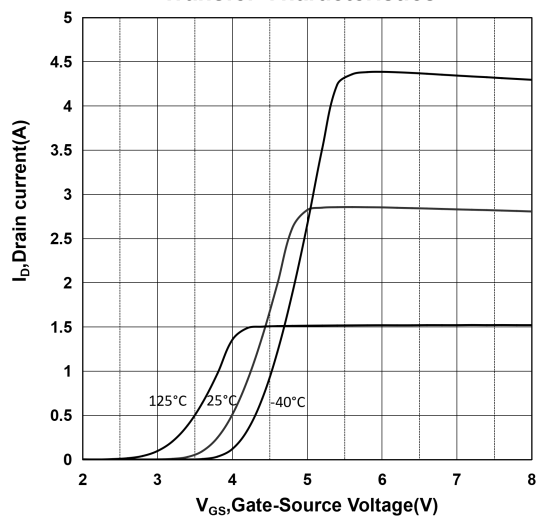
Extended On-Region Characteristic@25°C



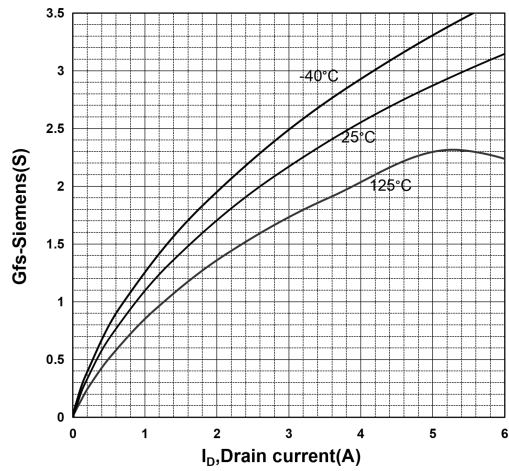
On-Region Characteristic@125°C



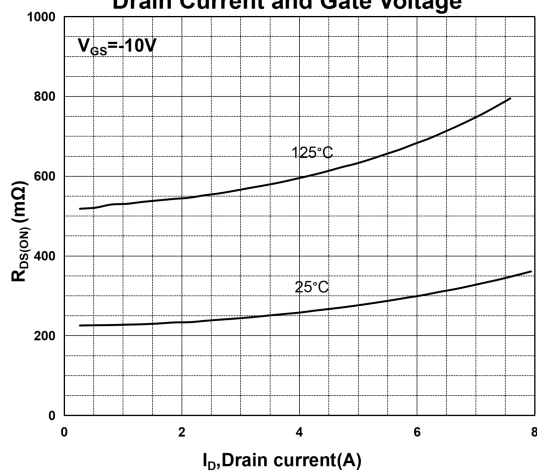
Transfer Characteristics



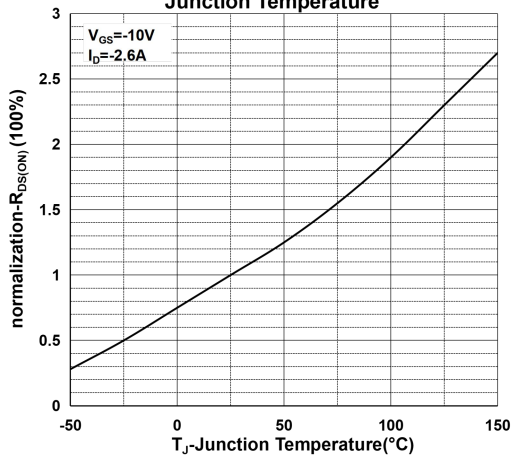
**Transconductance**



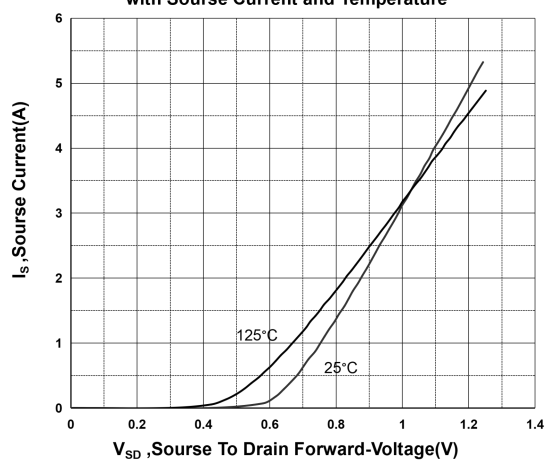
**On-Resistance Variation vs Drain Current and Gate Voltage**



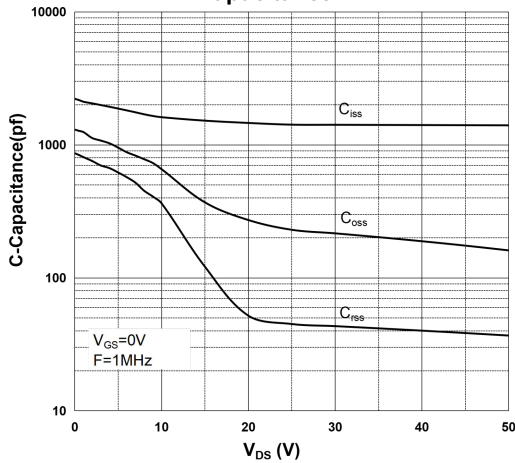
**Normalization On-Resistance Variation vs Junction Temperature**



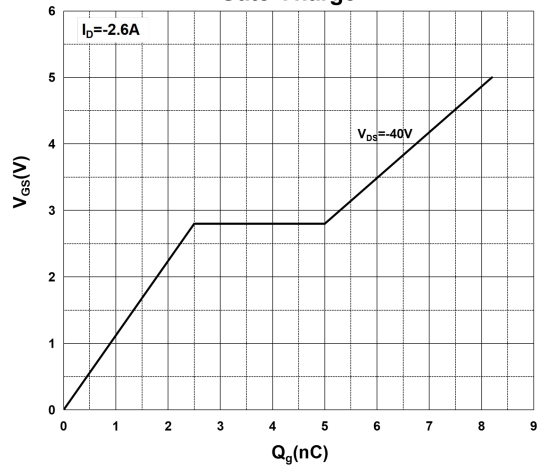
**Body Diode Forward Voltage Variation with Source Current and Temperature**



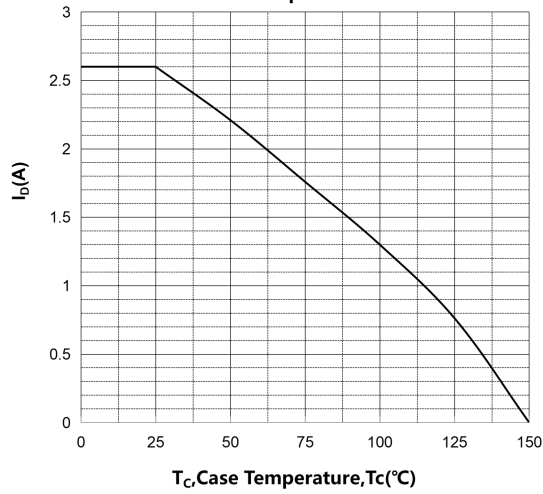
**Capacitance**



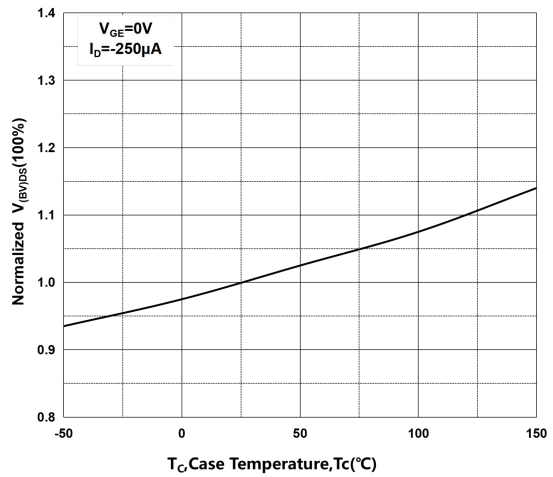
**Gate Charge**



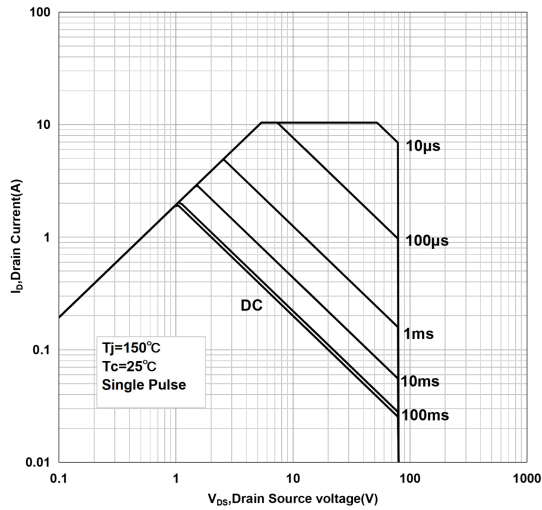
**Maximum Drain Current vs Case Temperature**



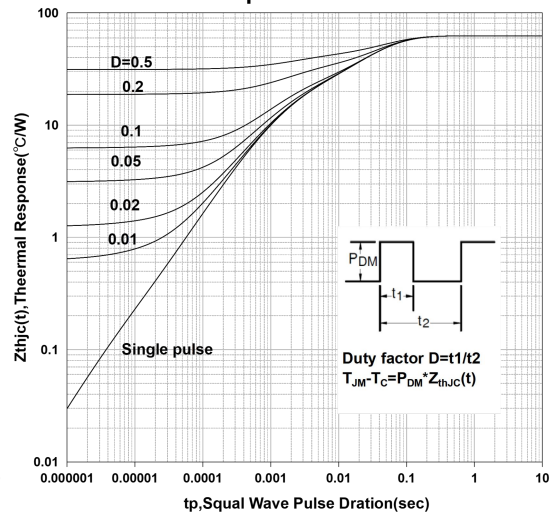
**Normalized  $V_{(BV)DS}$  vs temperature**



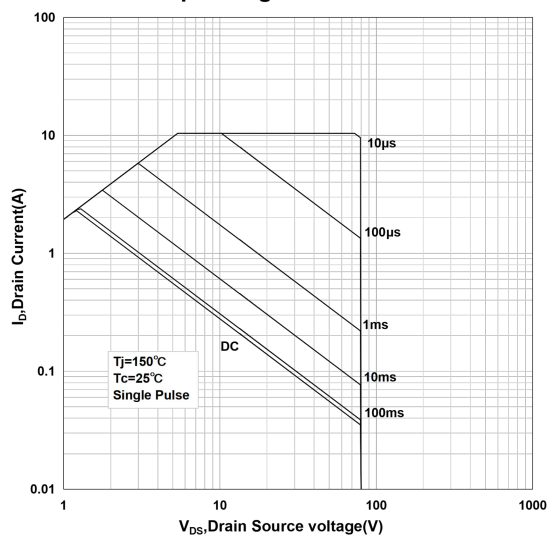
**Safe Operating Area for SOP-8**



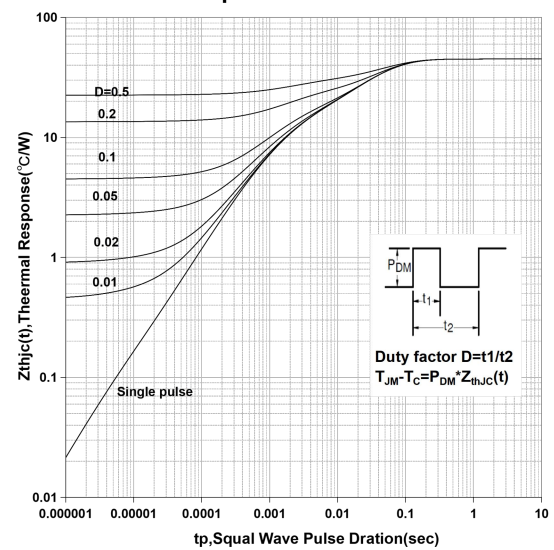
**Transient response Curve for SOP-8**



**Safe Operating Area for DFN5x6**



**Transient response Curve for DFN5x6**



### N-Chanel Measurement circuit

Fig.1-1 Switching Time Measurement Circuit

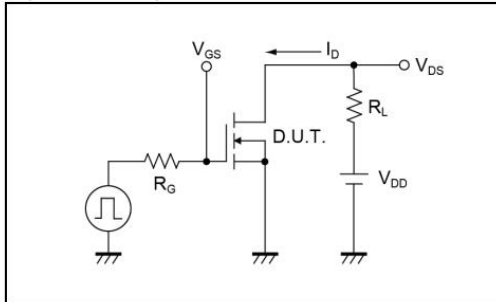


Fig.1-2 Switching Waveforms

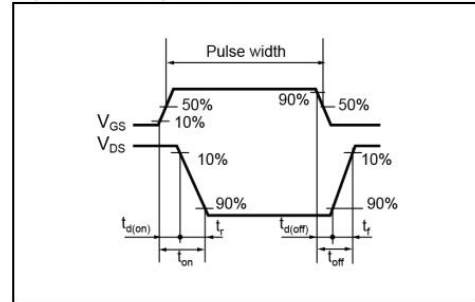


Fig.2-1 Gate Charge Measurement Circuit

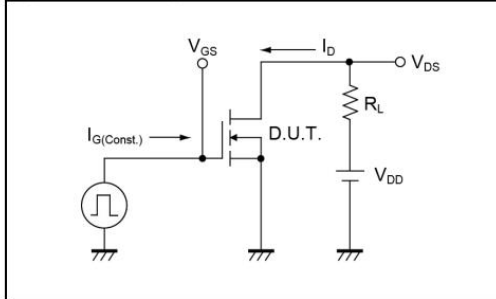
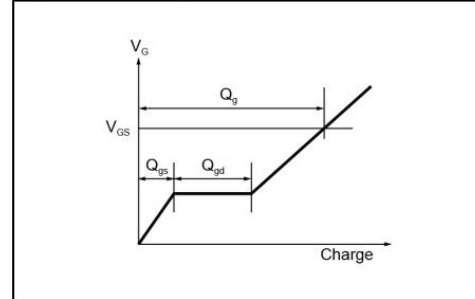


Fig.2-2 Gate Charge Waveform



### P-Chanel Measurement circuit

Fig.3-1 Switching Time Measurement Circuit

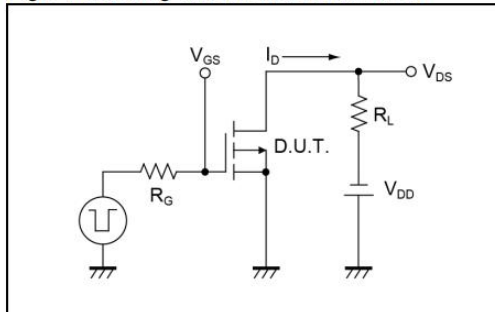


Fig.3-2 Switching Waveforms

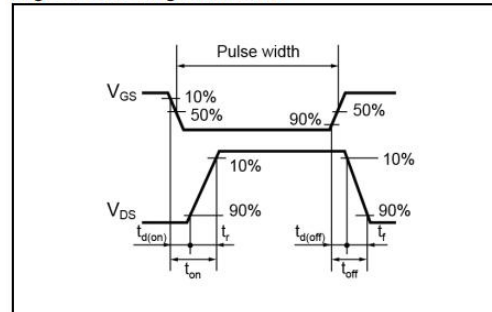


Fig.4-1 Gate Charge Measurement Circuit

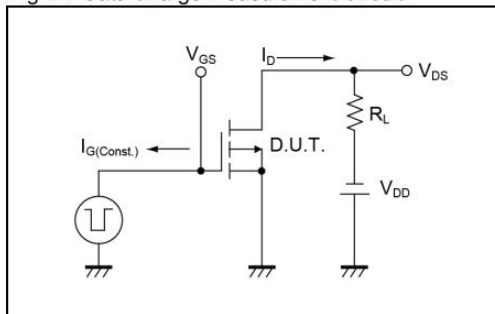
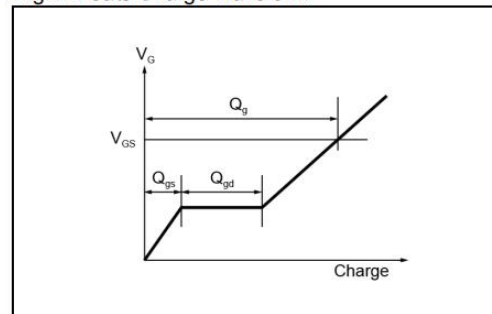


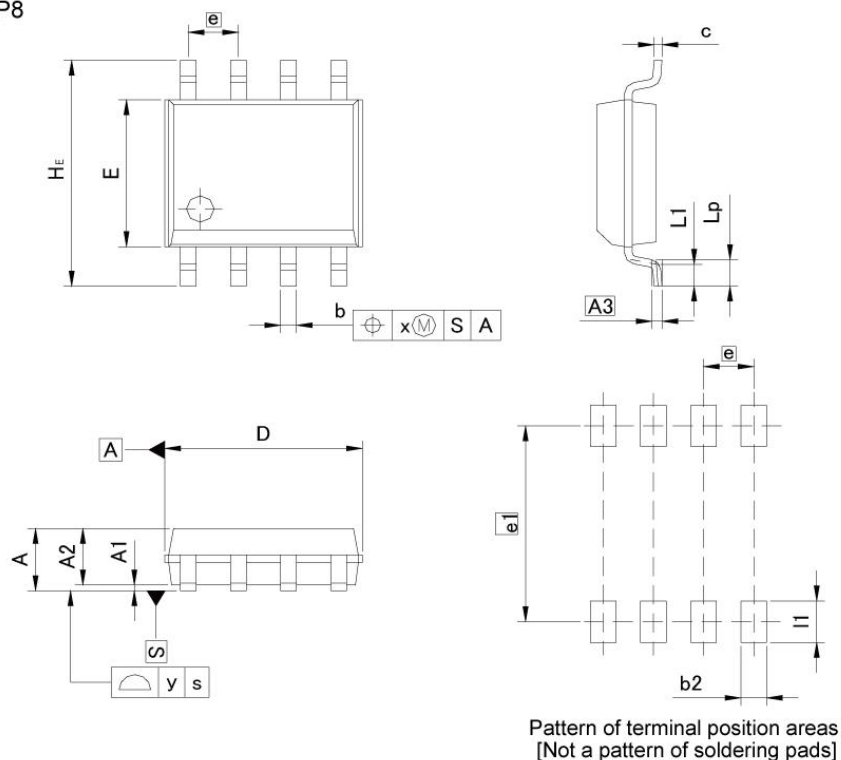
Fig.4-2 Gate Charge Waveform





### PACKAGE MECHANICAL DATA

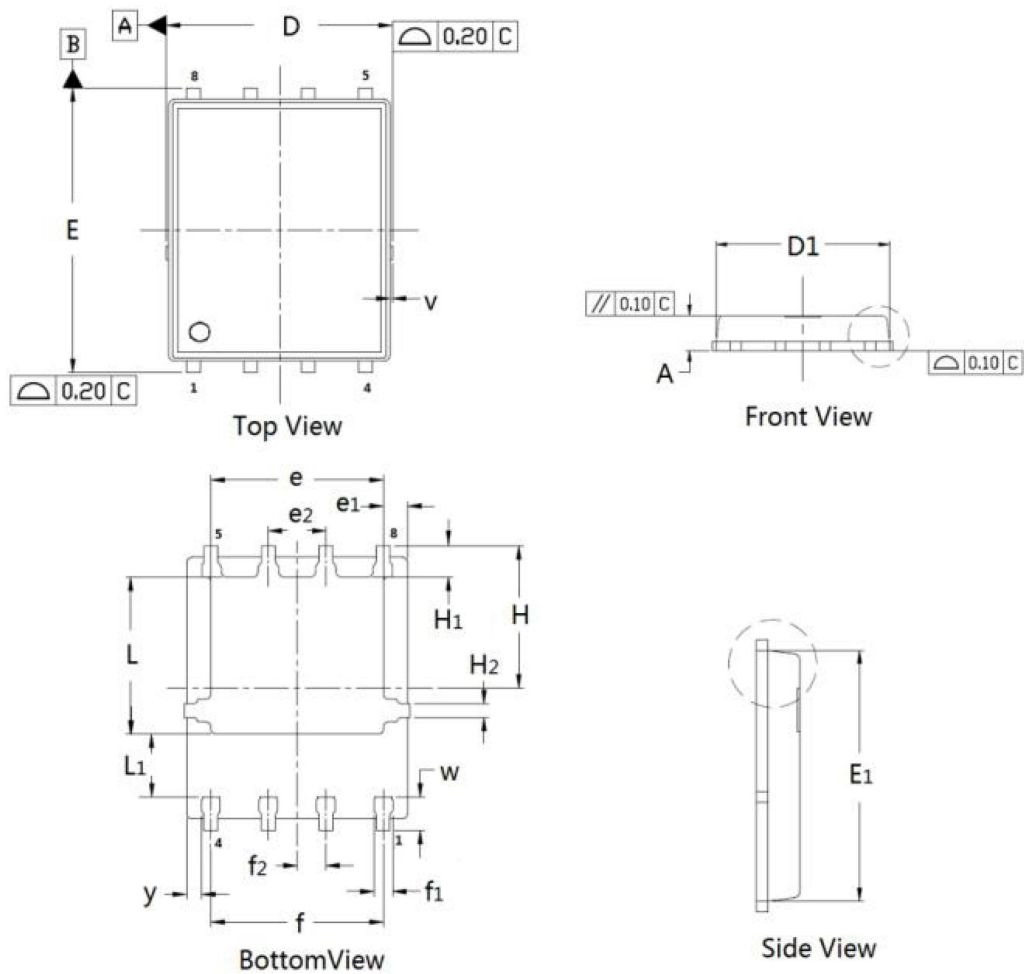
SOP8



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.75	-	0.069
A1	0.15		0.006	
A2	1.40	1.60	0.055	0.063
A3	0.25		0.010	
b	0.30	0.50	0.012	0.020
c	0.10	0.30	0.004	0.012
D	4.80	5.20	0.189	0.205
E	3.75	4.05	0.148	0.159
e	1.27		0.050	
HE	5.70	6.30	0.224	0.248
L1	0.40	0.60	0.016	0.024
Lp	0.65	0.85	0.026	0.033
x	0.15		0.006	
y	0.10		0.004	

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.65	-	0.026
e1	5.15		0.203	
l1	-	1.15	-	0.045

Dimension in mm/inches



**DFN 5x6**

**DIMENSIONS** ( unit : mm )

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.02	1.10	D	4.90	4.98	5.10
D1	4.80	4.89	5.00	E	6.00	6.11	6.20
E1	5.65	5.74	5.85	e	3.72	3.80	3.92
e1	--	0.54	--	e2	--	1.27	--
f	--	3.82	--	f1	0.31	0.37	0.51
f2	--	0.64	--	H	--	3.15	--
H1	0.59	0.63	0.79	H2	0.26	0.28	0.32
L	3.38	3.45	3.58	L1	--	1.39	--
v	--	0.13	--	w	0.64	0.68	0.84
y	--	0.34	--		--		--