



STN4NF03L

N-CHANNEL 30V - 0.039Ω - 4A SOT-223

STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STN4NF03L	30V	<0.05Ω	4A

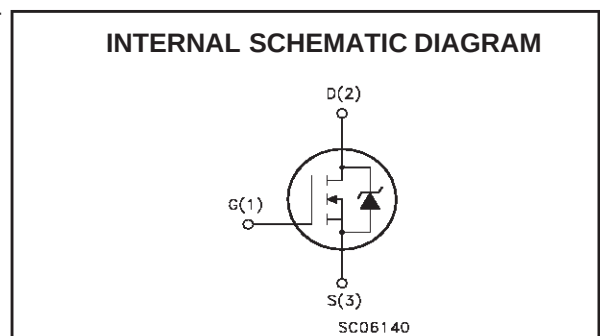
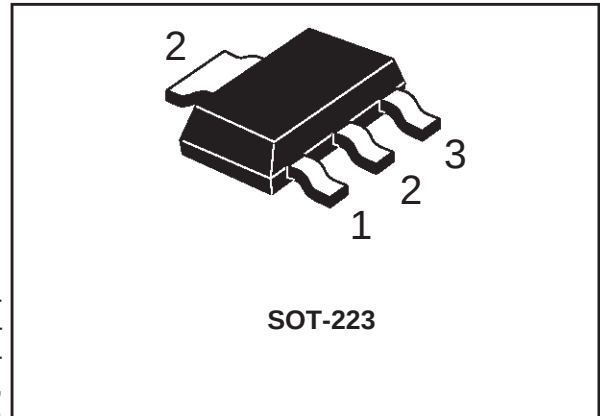
- TYPICAL R_{DS(on)} = 0.039Ω
- LOW THRESHOLD DRIVE

DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- DC-DC & DC-AC CONVERTERS
- DC MOTOR CONTROL (DISK DRIVES, etc.)
- SYNCHRONOUS RECTIFICATION



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	30	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	30	V
V _{GS}	Gate- source Voltage	±15	V
I _D	Drain Current (continuous) at T _C = 25°C	4	A
I _D	Drain Current (continuous) at T _C = 100°C	2.5	A
I _{DM} (●)	Drain Current (pulsed)	16	A
P _{TOT}	Total Dissipation at T _C = 25°C	2.5	W
	Derating Factor	0.02	W/°C
E _{AS} (1)	Single Pulse Avalanche Energy	20	mJ
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area

(1) Starting T_j=25°C, I_D=11A, V_{DD}=15V

STN4NF03L

THERMAL DATA

Rthj-pcb	Thermal Resistance Junction-PC Board Max	50	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max (Surface Mounted)	60	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	260	°C

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 µA, V _{GS} = 0	30			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	µA µA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250µA	1			V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10V, I _D = 2 A V _{GS} = 5 V, I _D = 2 A		0.039 0.046	0.05 0.06	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)} max, V _{GS} = 10V	4			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)} max, I _D = 2A	1	3		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		330		pF
C _{oss}	Output Capacitance			90		pF
C _{rss}	Reverse Transfer Capacitance			40		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15V, I_D = 2A$		11		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		100		ns
Q_g	Total Gate Charge	$V_{DD} = 24V, I_D = 4A,$ $V_{GS} = 10V$		6.5	9	nC
Q_{gs}	Gate-Source Charge			3.6		nC
Q_{gd}	Gate-Drain Charge			2		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15V, I_D = 2A,$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		25		ns
t_f	Fall Time			22		ns
$t_{r(off)}$	Off-voltage Rise Time	$V_{clamp} = 24V, I_D = 2A$ $R_G = 4.7\Omega, V_{GS} = 4.5V$		22		ns
t_f	Fall Time	(see test circuit, Figure 5)		55		ns
t_c	Cross-over Time			75		ns

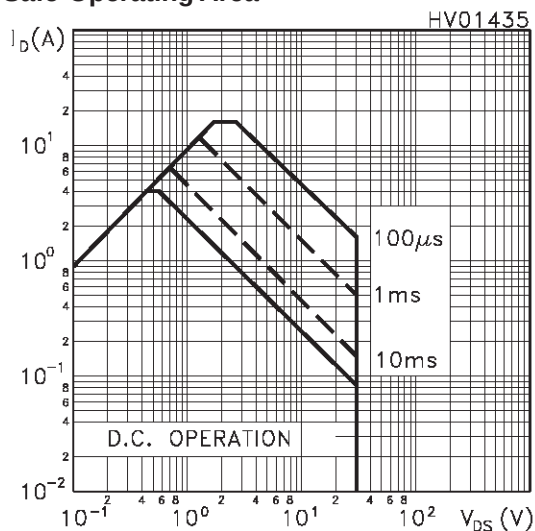
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				4	A
$I_{SDM}(1)$	Source-drain Current (pulsed)				16	A
$V_{SD}(2)$	Forward On Voltage	$I_{SD} = 4A, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 4A, di/dt = 100A/\mu s,$ $V_{DD} = 15V, T_J = 150^\circ C$ (see test circuit, Figure 5)		30		ns
Q_{rr}	Reverse Recovery Charge			18		nC
I_{RRM}	Reverse Recovery Current			1.2		A

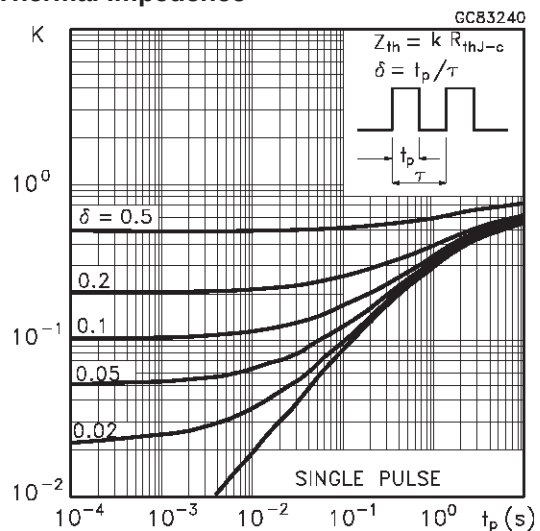
Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

2. Pulse width limited by safe operating area.

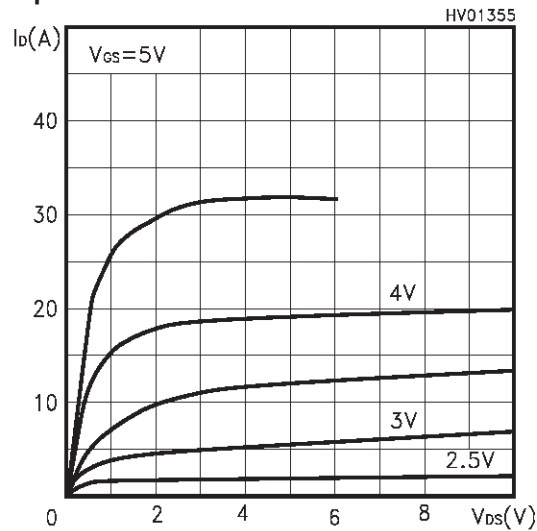
Safe Operating Area



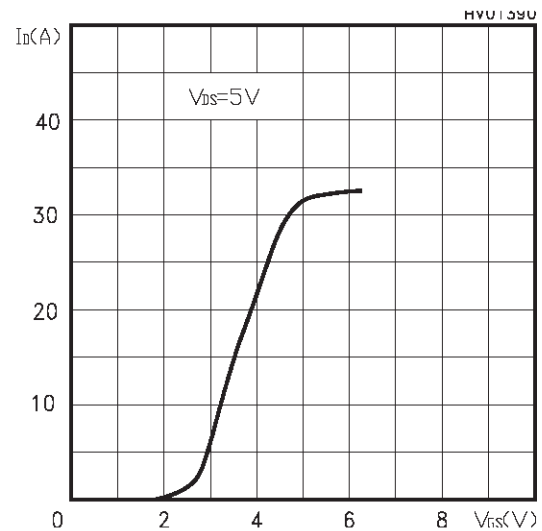
Thermal Impedance



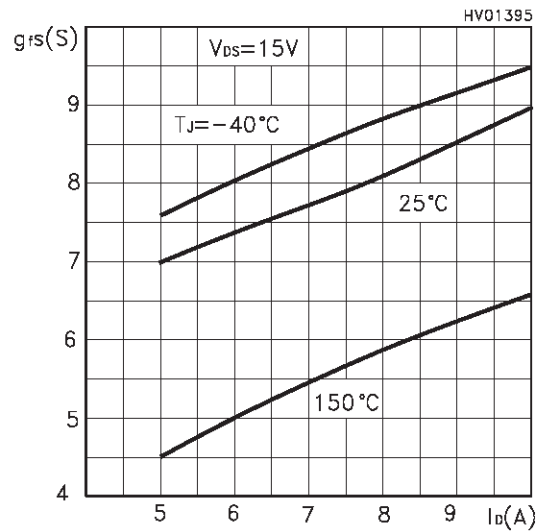
Output Characteristics



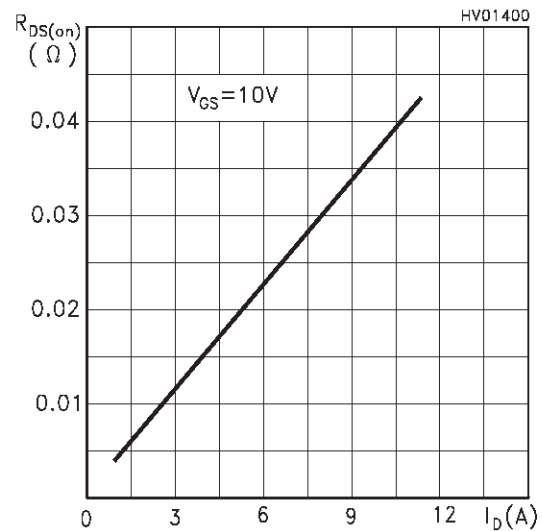
Transfer Characteristics



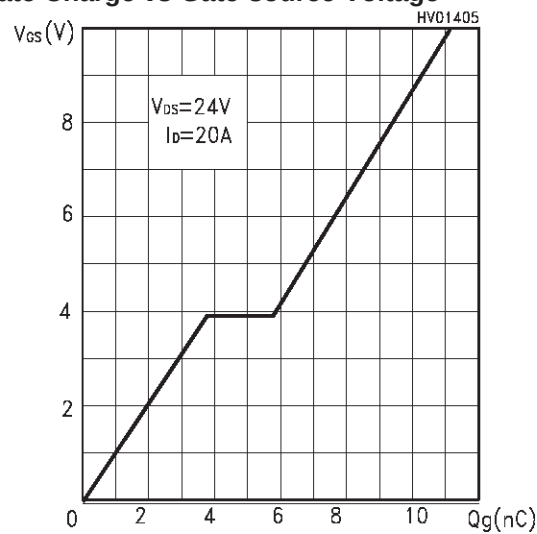
Transconductance



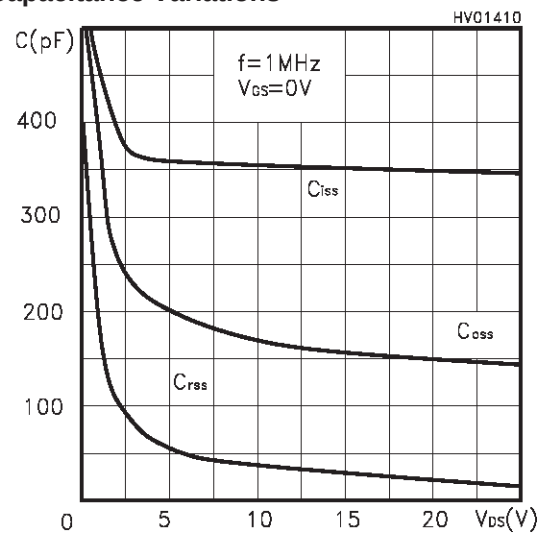
Static Drain-source On Resistance



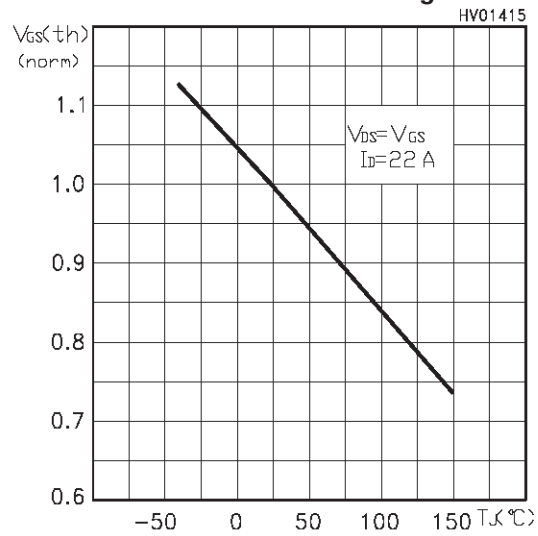
Gate Charge vs Gate-source Voltage



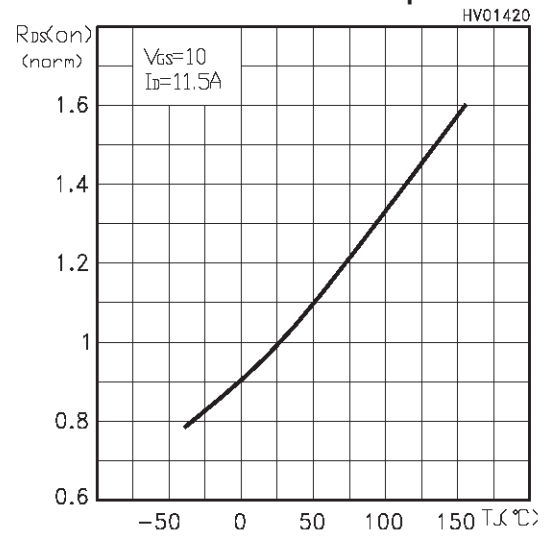
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

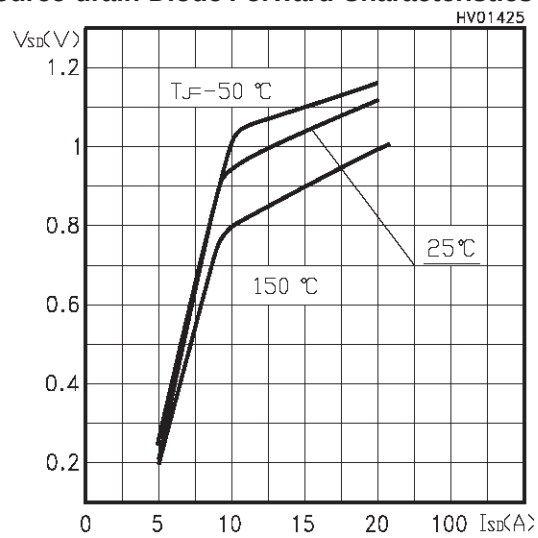


Fig. 1: Unclamped Inductive Load Test Circuit

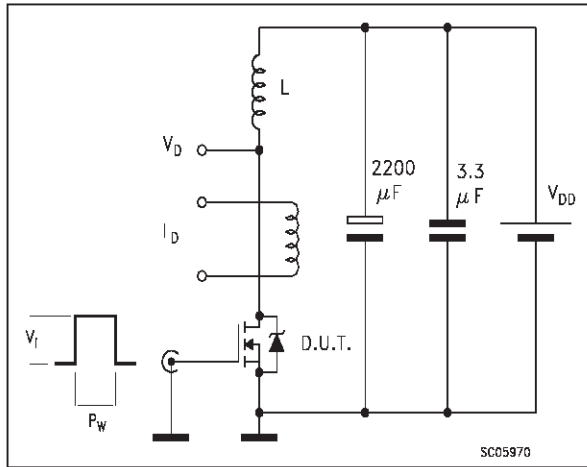


Fig. 2: Unclamped Inductive Waveform

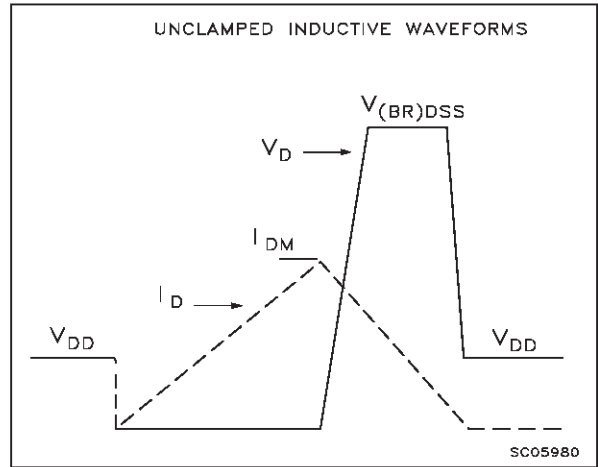


Fig. 3: Switching Times Test Circuit For Resistive Load

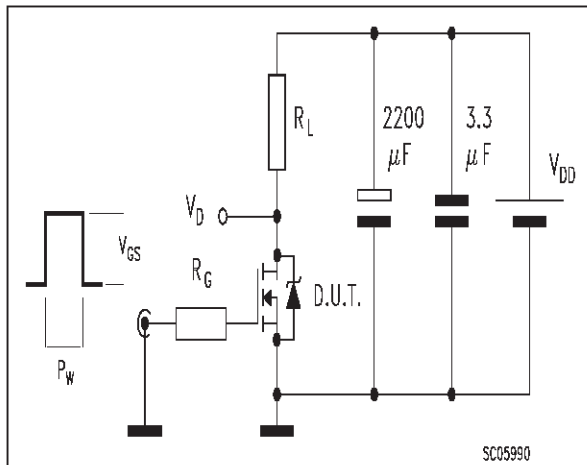


Fig. 4: Gate Charge test Circuit

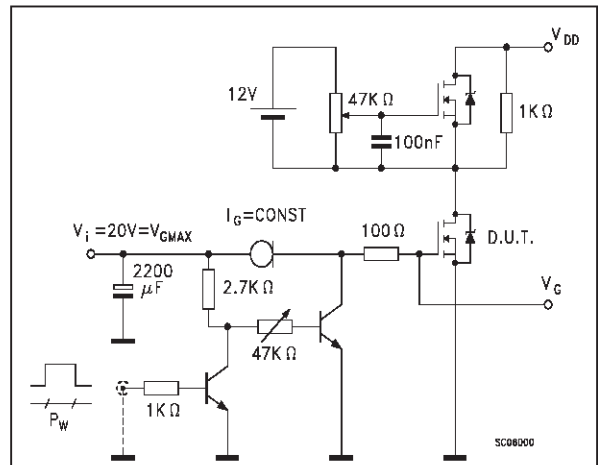
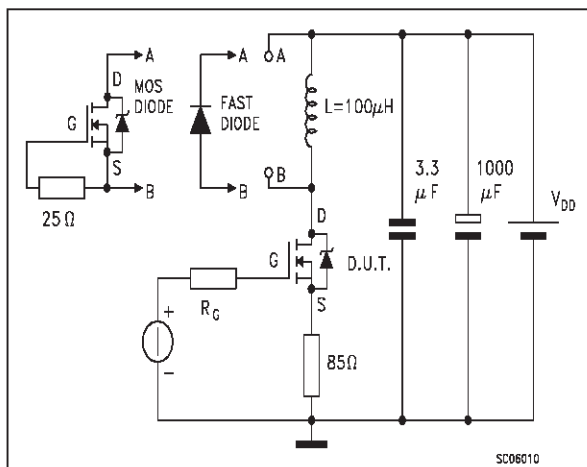
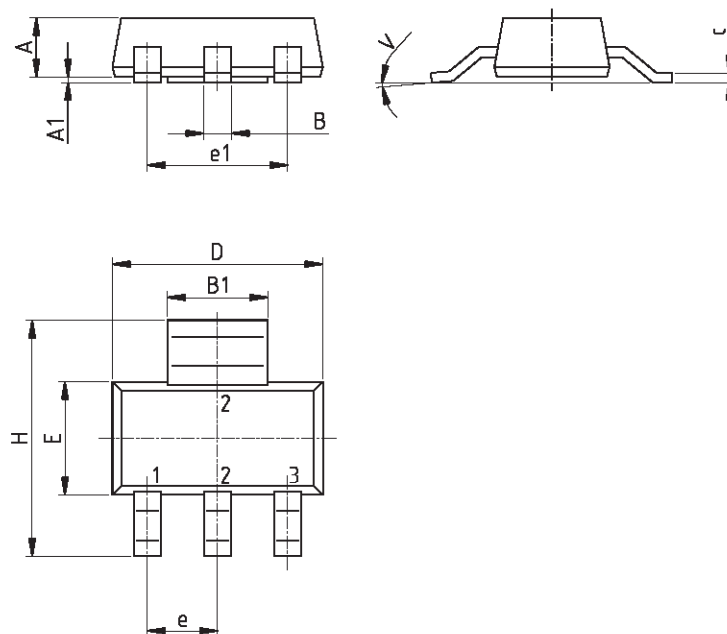


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SOT-223 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10°			10°
A1		0.02				



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