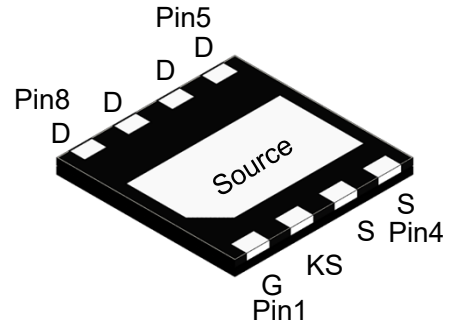


650V Enhancement-mode GaN Transistor

Description

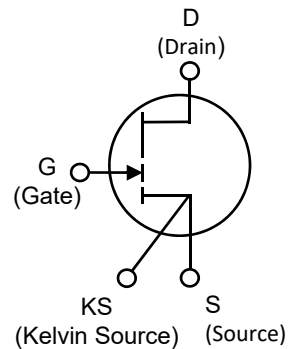
650V Normally-OFF GaN			
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)$	$I_{DS}(A)$	$Q_G(nC)$
650	160	13	2.2



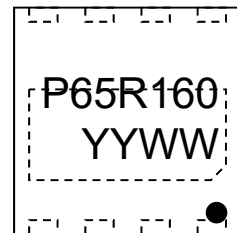
Feature

- Normally off power switch
- No reverse-recovery charge
- Ultra high switching frequency
- Low gate charge, low output charge
- Qualified for industrial applications according to JEDEC Standards
- Package:DFN8*8-8L

Bottom View



Circuit Diagram



Pin4 Pin1
Marking (Top View)

Applications

- Fast charger
- Renewable energy
- Telecom and data-com
- Servo motors
- Industrial
- Automotive

Absolute maximum rating@25°C

Rating	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	650	V
Drain-Source Voltage-transient ¹⁾	$V_{DS(transient)}$	750	V
Gate-Source Voltage	V_{GS}	-10 to +7	V
Drain Current-Continuous ²⁾	$T_C = 25^\circ C$	13	A
	$T_C = 125^\circ C$	6.0	A
Pulse Drain Current (pulse width: 300μs)	$T_C = 25^\circ C$	17	A
	$T_C = 125^\circ C$	10	
Maximum Power Dissipation	P_D	64	W
Junction and Storage Temperature Range	T_J, T_{STG}	-55~+150	°C

Notes:

1. Non-repetitive events, $T_{pulse} < 200\mu s$.
2. For increased stability at high current operation.

Thermal characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance, Junction - Case	$R_{\theta JC}$	-	1.96	-	$^{\circ}\text{C}/\text{W}$

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}$	650	-	-	V
Total Drain Leakage Current	I_{DSS}	$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}$	-	1.0	20	μA
		$V_{DS} = 650\text{V}, V_{GS} = 0\text{V}, T_J = 150^{\circ}\text{C}$	-	10	50	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 1\text{mA}$	1.8	2.5	3.5	V
		$V_{GS} = V_{DS}, I_D = 1\text{mA}, T_J = 150^{\circ}\text{C}$	-	2.8	-	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = 6\text{V}, V_{DS} = 0\text{V}$	-	60	-	μA
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 6\text{V}, I_D = 1\text{A}$	-	160	220	m Ω
		$V_{GS} = 6\text{V}, I_D = 1\text{A}, T_J = 150^{\circ}\text{C}$	-	330	-	
Input Capacitance	C_{iss}	$V_{DS} = 400\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	66	-	pF
Output Capacitance	C_{oss}		-	26	-	
Reverse Transfer Capacitance	C_{rss}		-	0.9	-	
Effective Output Capacitance, Energy Related	$C_{oss(er)}$	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 400\text{V}$	-	48	-	pF
Effective Output Capacitance, Time Related	$C_{oss(tr)}$		-	68	-	
Output Charge	Q_{oss}	$V_{GS} = 0\text{V}, V_{DS} = 0\text{V to } 400\text{V}$	-	27	-	nC
Total Gate Charge	Q_g	$V_{GS} = 0 \text{ to } 6\text{V}, V_{DS} = 400\text{V}, I_D = 1\text{A}$	-	2.2	-	nC
Gate-Source Charge	Q_{gs}		-	0.2	-	
Gate-Drain Charge	Q_{gd}		-	0.8	-	
Reverse Device Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0\text{V}, I_S = 3\text{A}$	-	3.0	-	V
Reverse Recovery Charge	Q_{rr}	$I_S = 3\text{A}, V_{DS} = 400\text{V}$	-	0	-	nC

Typical Characteristics

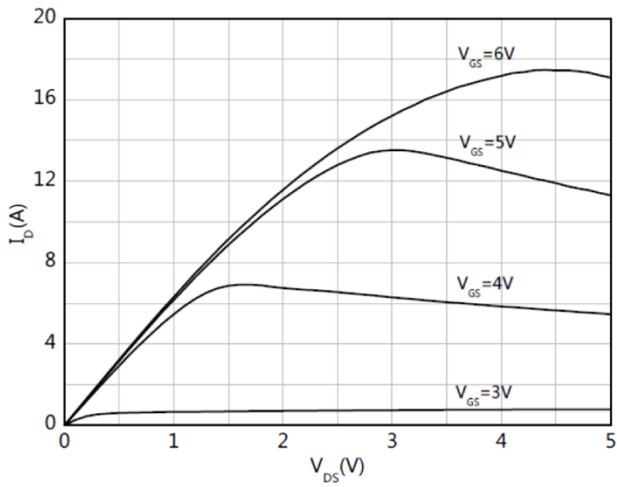


Figure 1. Typical Output Characteristics $T_j=25^\circ\text{C}$

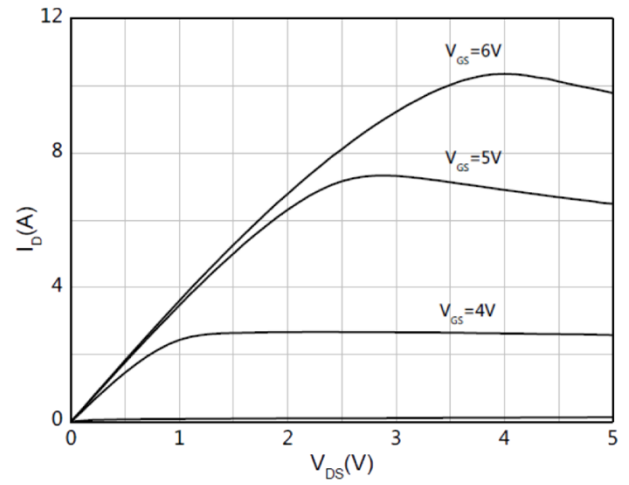


Figure 2. Typical Output Characteristics $T_j=125^\circ\text{C}$

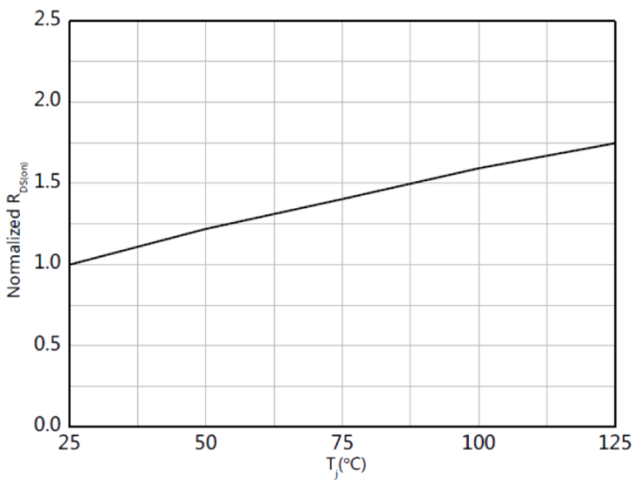


Figure 3. Drain-source On-state Resistance

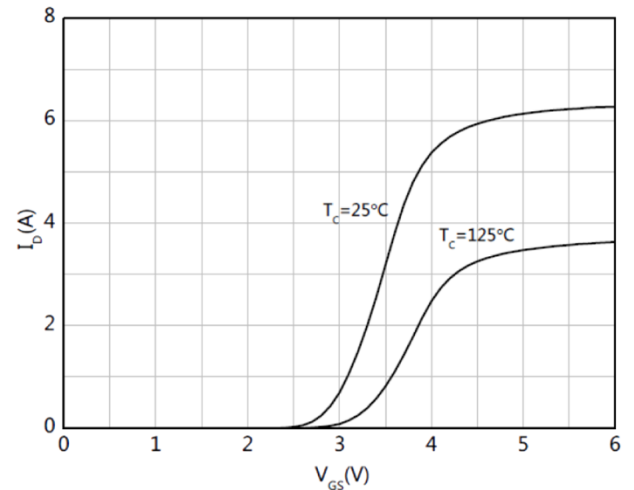


Figure 4. Typical Transfer Characteristics $V_{DS}=1\text{V}$

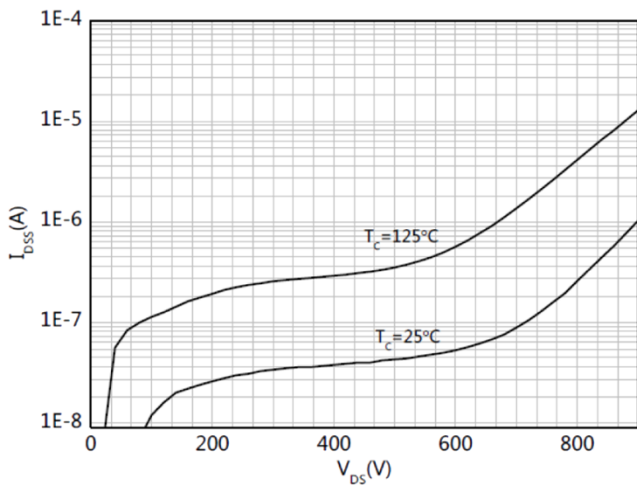


Figure 5. Drain-source Leakage Characteristics

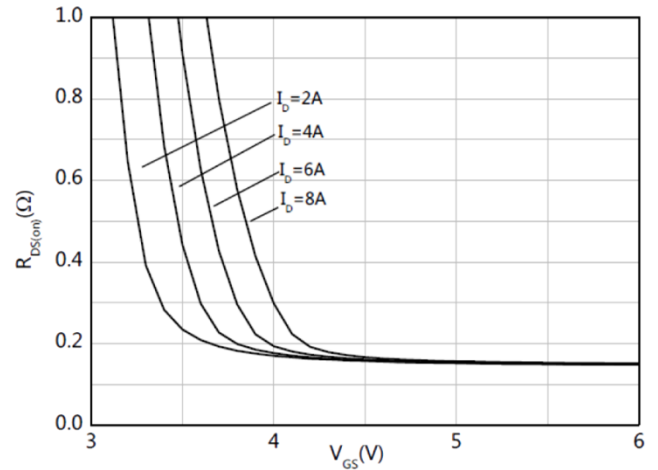


Figure 6. Typical On-state Resistance $T_j=25^\circ\text{C}$

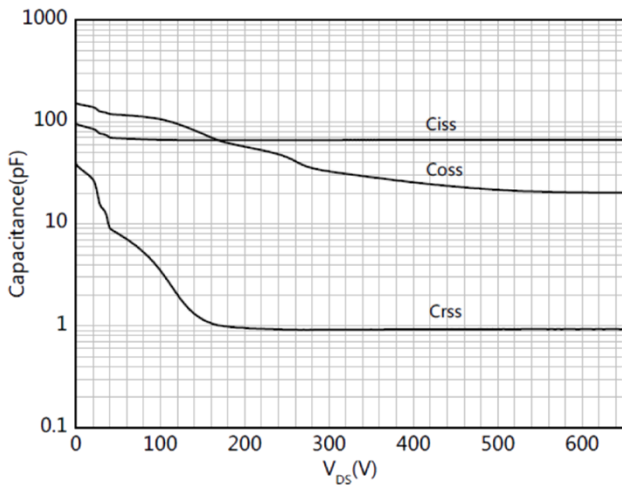


Figure 7. Typical Capacitance $f=1\text{MHz}$

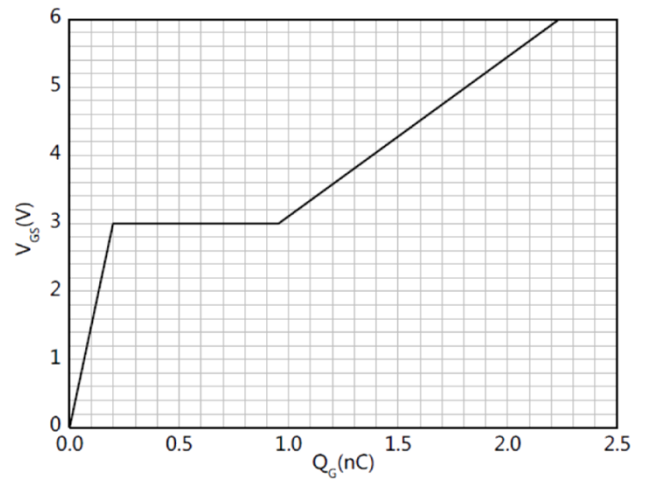


Figure 8. Typical Gate Charge ($V_{DS}=400\text{V}$, $I_D=1\text{A}$)

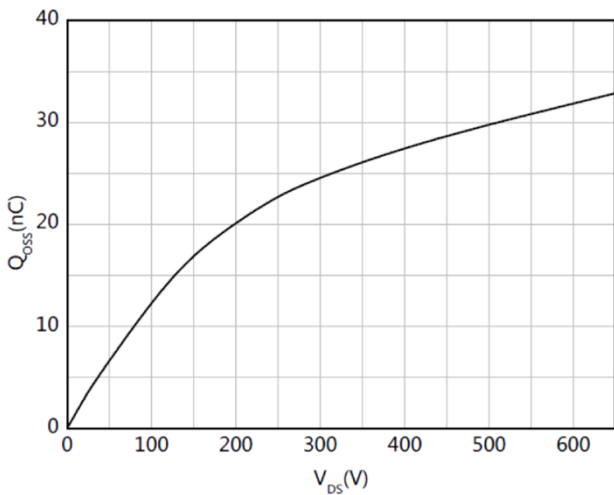


Figure 9. Typical Output Charge $f=1\text{MHz}$

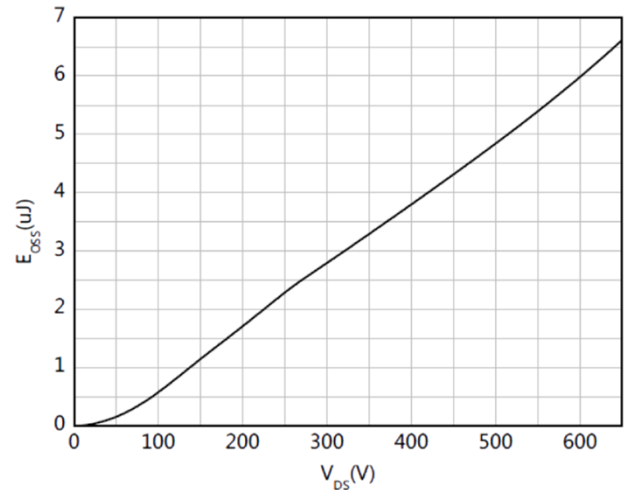


Figure 10. Typical C_{oss} Stored Energy $f=1\text{MHz}$

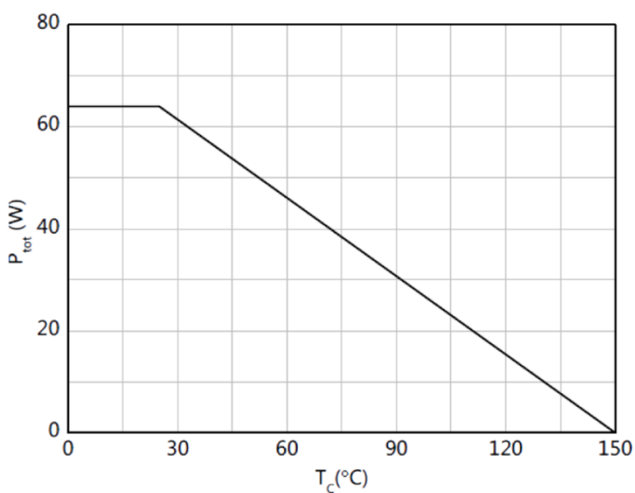


Figure 11. Power Dissipation

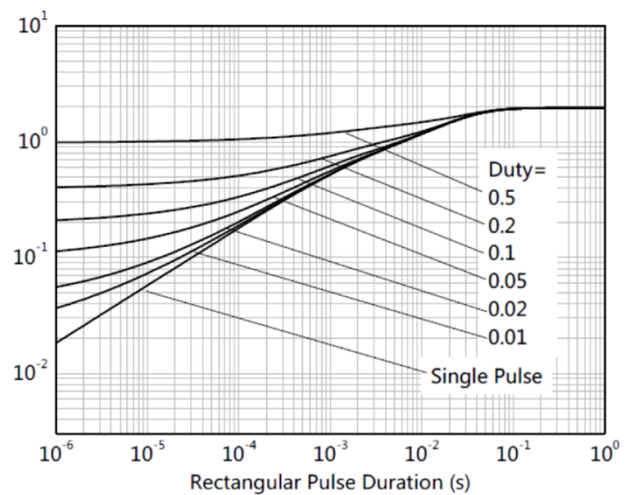


Figure 12. Transient Thermal Impedance

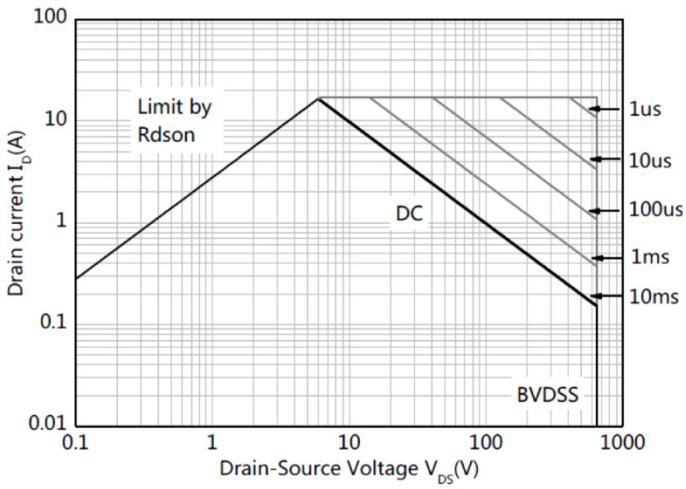


Figure 13. Safe Operation Area $T_c=25^\circ\text{C}$

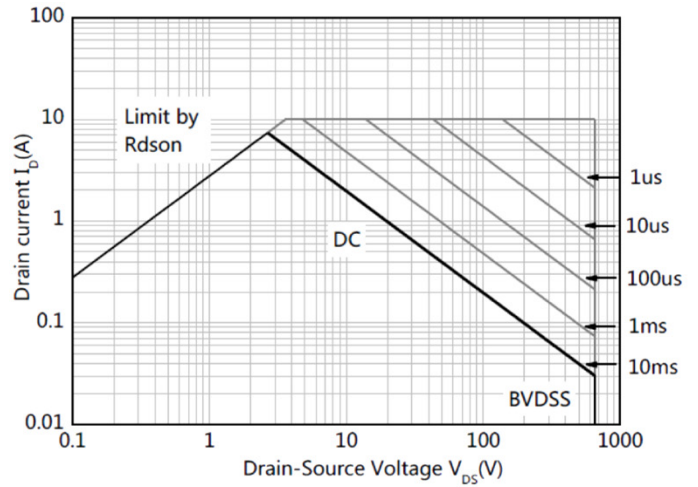


Figure 14. Safe Operation Area $T_c=125^\circ\text{C}$

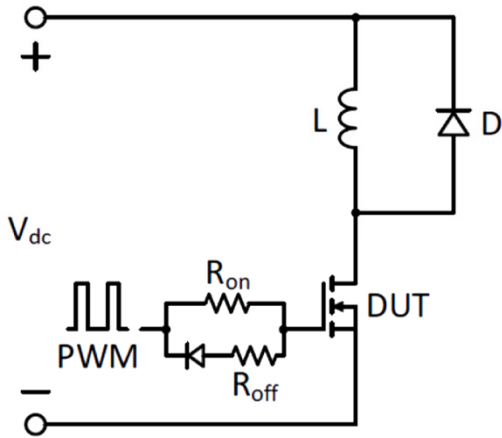


Figure 15. Switching Times With Inductive Load

$V_{DS}=400\text{V}$, $V_{GS}=0\text{V to }6\text{V}$, $I_D=3\text{A}$,
 $R_{G-on(ext)}=6.8\Omega$, $R_{G-off(ext)}=2.2\Omega$, $L=250\mu\text{H}$

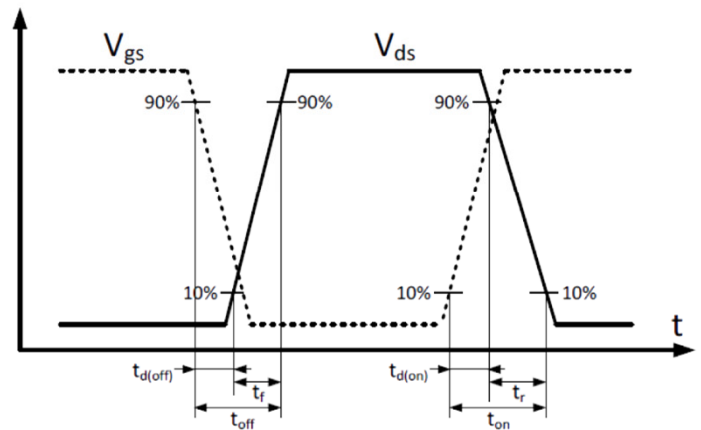
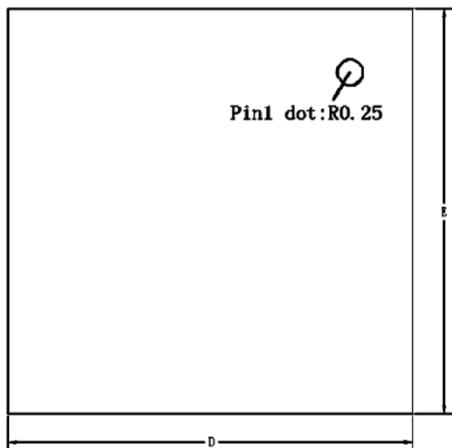


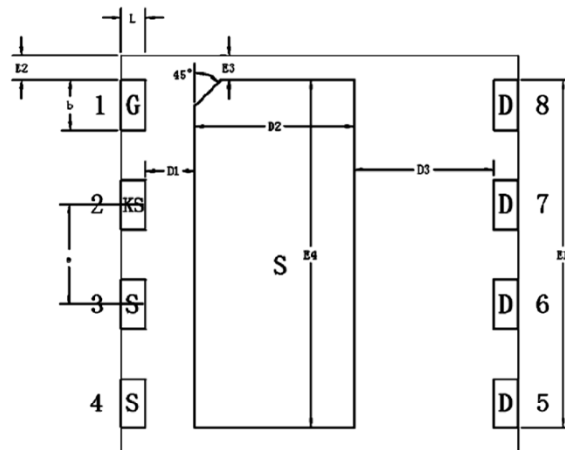
Figure 16. Switching Times With Waveform

Product Dimension (DFN8*8-8L)

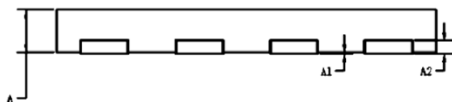
Top view



Bottom view



Side view(left/right)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	0.80	1.00	0.031	0.039	E1	6.90	7.10	0.272	0.280
A1	0.00	0.05	0.000	0.002	E2	0.40	0.60	0.016	0.024
A2	0.203 Ref.		0.008 Ref.		E3	0.40	0.60	0.016	0.024
D	7.90	8.10	0.311	0.319	E4	6.90	7.10	0.272	0.280
E	7.90	8.10	0.311	0.319	b	0.90	1.10	0.035	0.043
D1	0.90	1.10	0.035	0.043	e	1.90	2.10	0.075	0.083
D2	3.10	3.30	0.122	0.130	L	0.40	0.60	0.016	0.024
D3	2.70	2.90	0.106	0.114					