



PE40P20K P-Channel Enhancement Mode Power MOSFET

PE40P20K Description

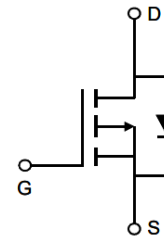
The PE40P20K uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE40P20K General Features

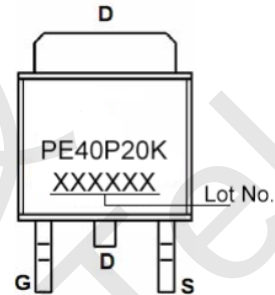
- $V_{DS} = -40V$, $I_D = -20A$
- $R_{DS(ON)} < 50m\Omega$ @ $V_{GS} = -10V$
- $R_{DS(ON)} < 70m\Omega$ @ $V_{GS} = -4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

PE40P20K Application

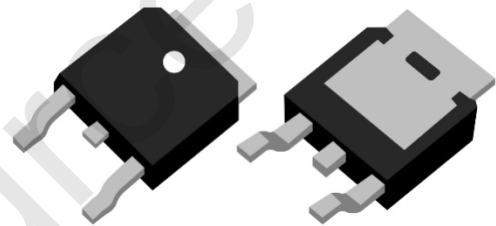
- DC-DC converter
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



TO-252-2L

PE40P20K Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-20	A
Drain Current-Continuous (TC=100°C)	I_D	-16	A
Pulsed Drain Current (Note 1)	I_{DM}	-60	A
Maximum Power Dissipation	P_D	50	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

PE40P20K Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3	°C/W
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PE40P20K Electrical Characteristics (TC=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	-1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.5	-2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-10A	-	42	50	mΩ
		V _{GS} =-4.5V, I _D =-8A	-	52	70	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-10A	-	20	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, F=1.0MHz	-	930	-	pF
Output Capacitance	C _{oss}		-	96	-	pF
Reverse Transfer Capacitance (Note 4)	C _{rss}		-	72	-	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DS} =-20V, R _L =1.6Ω, V _{GS} =-10V, R _G =3Ω	-	7.2	-	nS
Turn-on Rise Time	t _r		-	14	-	nS
Turn-Off Delay Time	t _{d(off)}		-	21	-	nS
Turn-Off Fall Time	t _f		-	8	-	nS
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-10A, V _{GS} =-10V	-	18	-	nC
Gate-Source Charge	Q _{gs}		-	3.2	-	nC
Gate-Drain Charge	Q _{gd}		-	3.8	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-1A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _S		-	-	-20	A
Diode Reverse Recovery Time	t _{rr}	I _F =-10A, dI/dt=100A/μs	-	26	-	nS
Diode Reverse Recovery Charge	Q _{rr}		-	18	-	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to product.



PE40P20K Typical Electrical and Thermal Characteristics

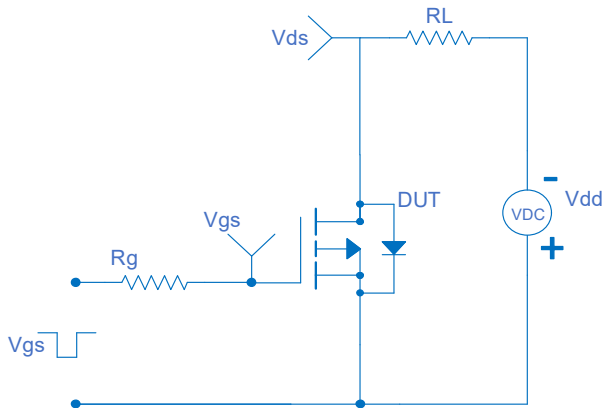


Figure 1 Switching Test Circuit

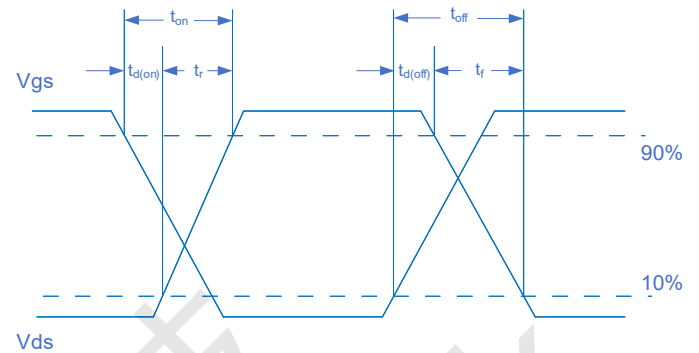


Figure 2 Switching Waveform

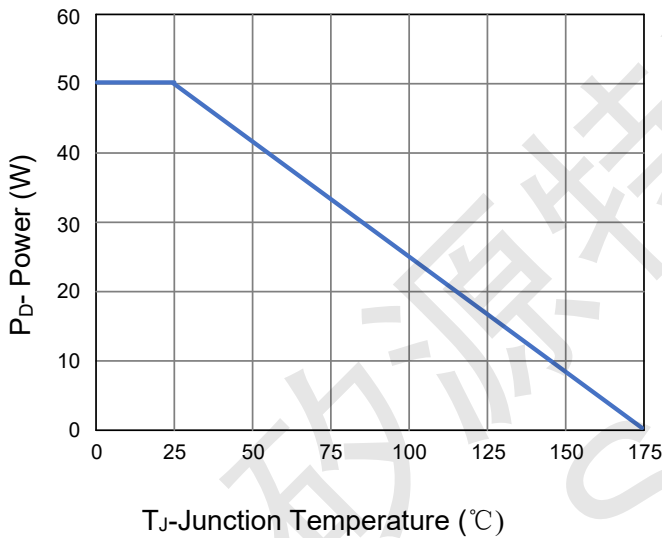


Figure 3 Power De-rating

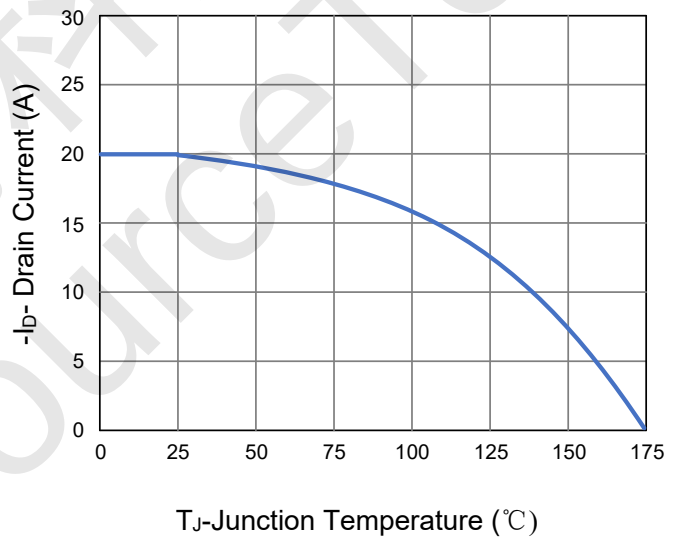


Figure 4 Drain Current

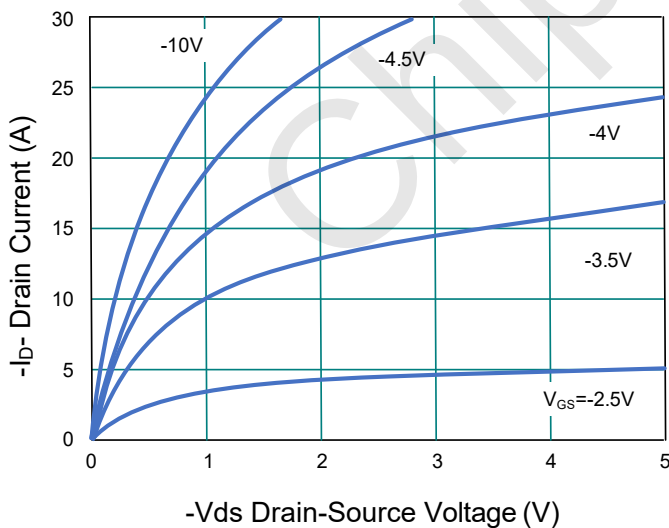


Figure 5 Output Characteristics

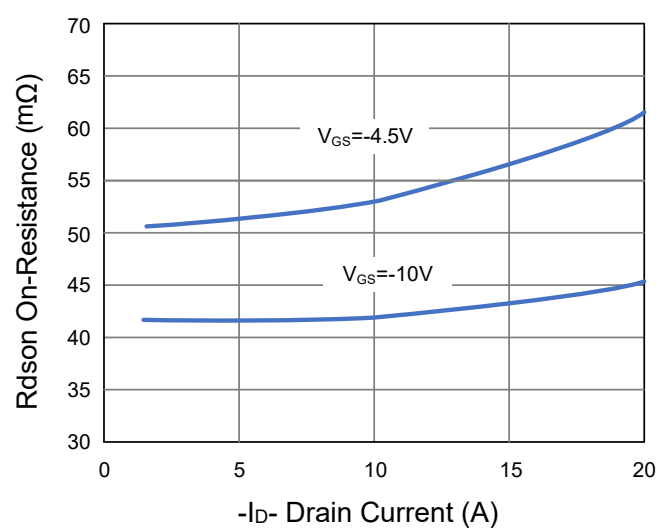


Figure 6 Rdson vs Drain Current

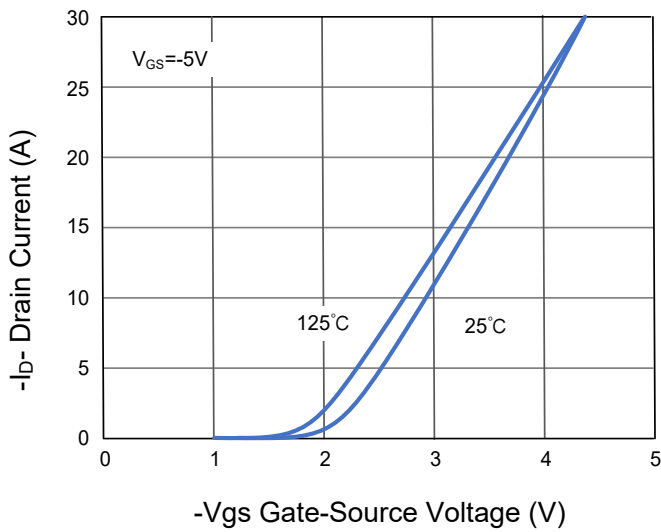


Figure 7 Transfer Characteristics

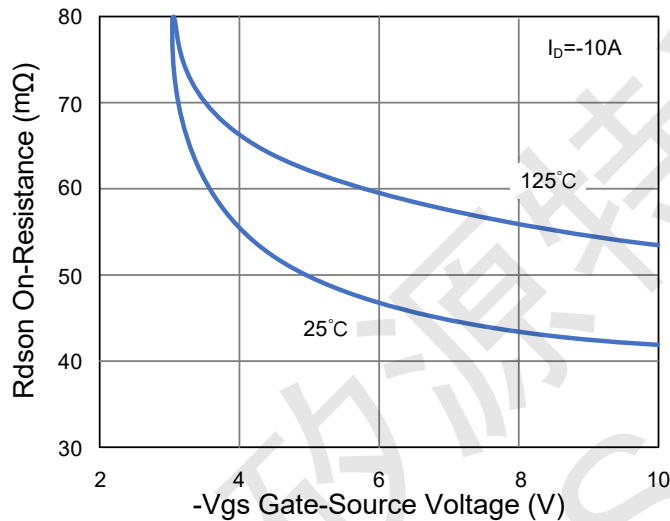


Figure 9 Rdson vs VGS

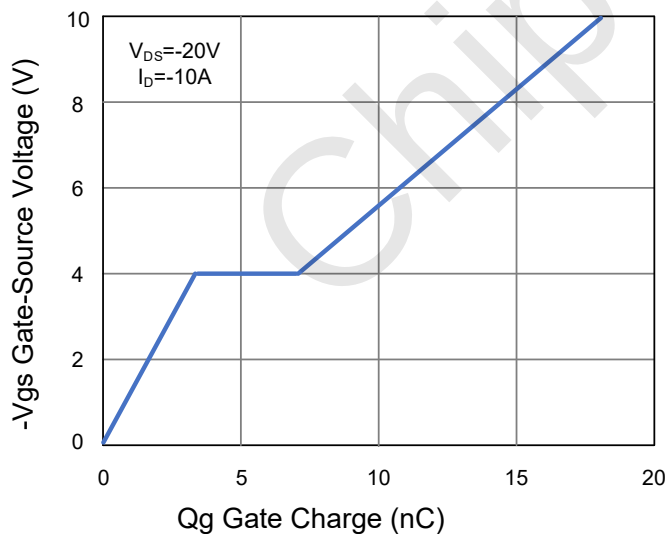


Figure 11 Gate Charge

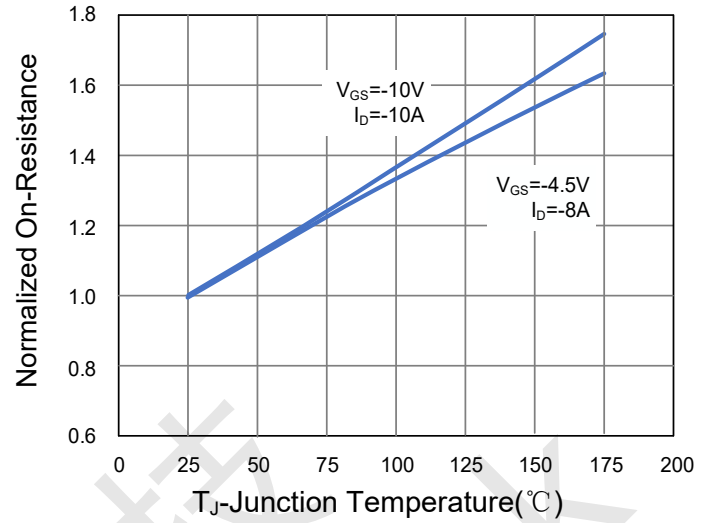


Figure 8 Rdson vs Junction Temperature

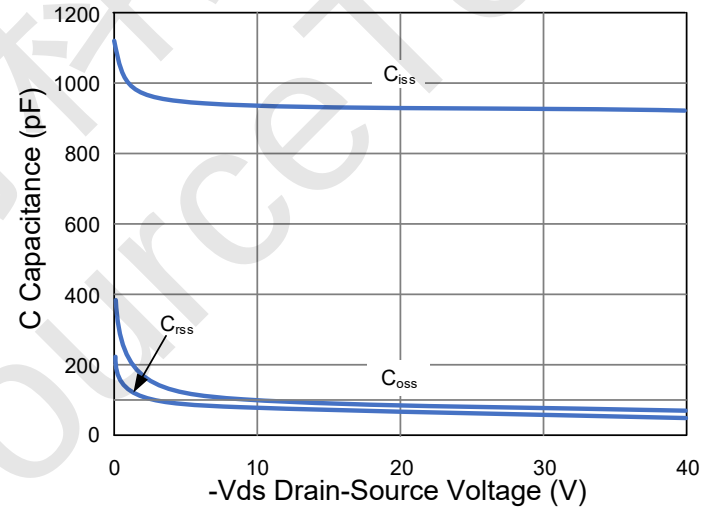


Figure 10 Capacitance vs Vds

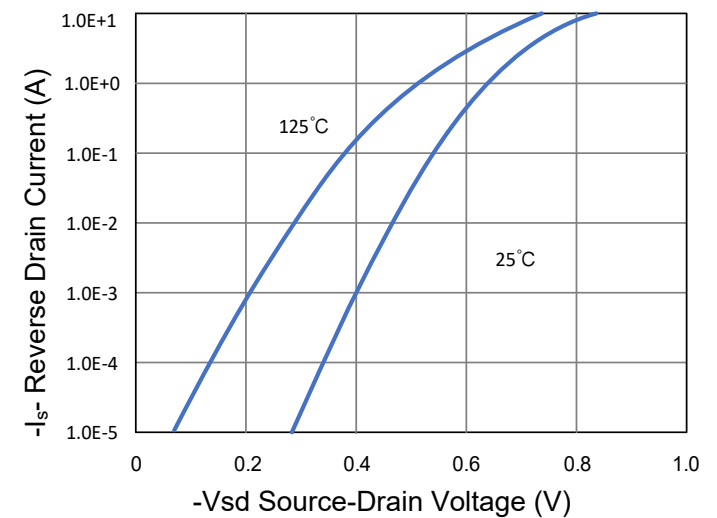


Figure 12 Source- Drain Diode Forward

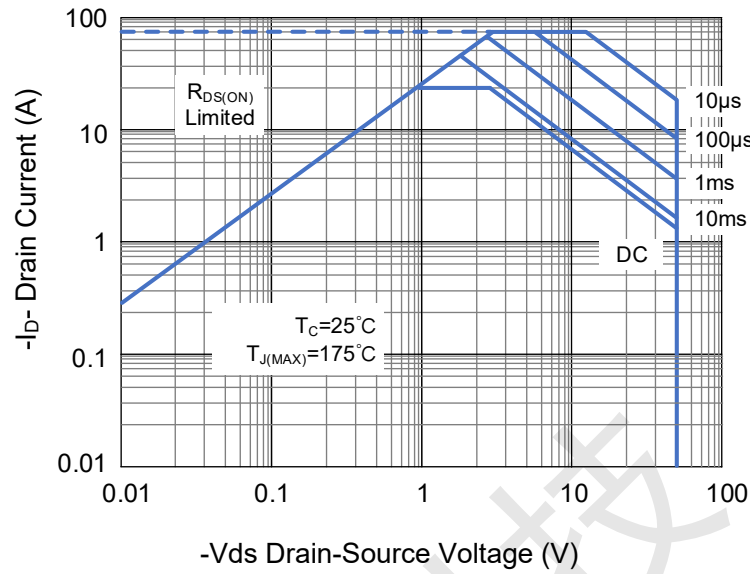


Figure 13 Safe Operation Area

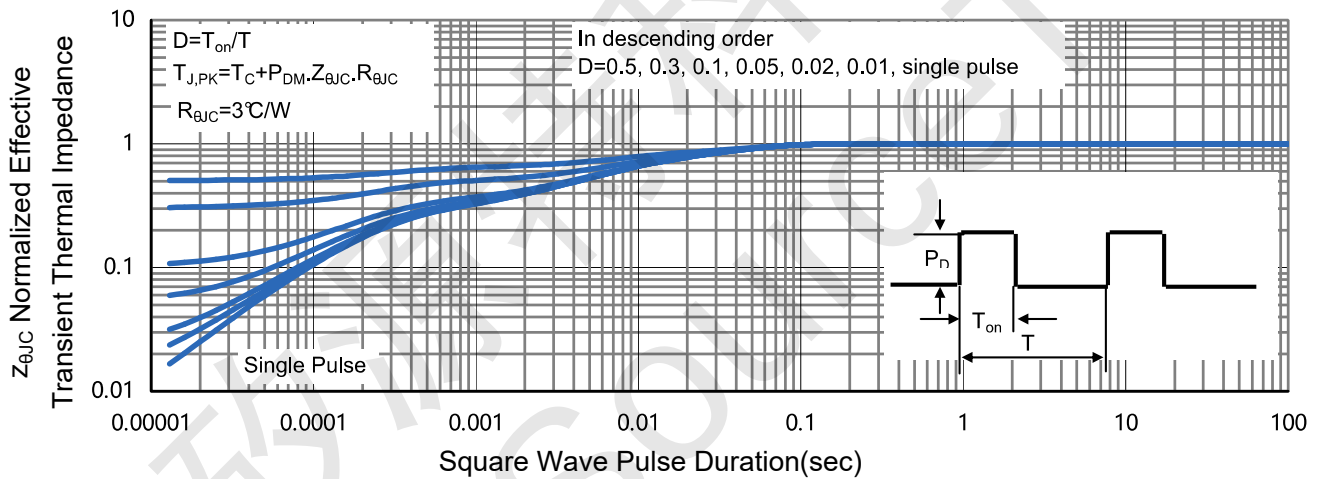
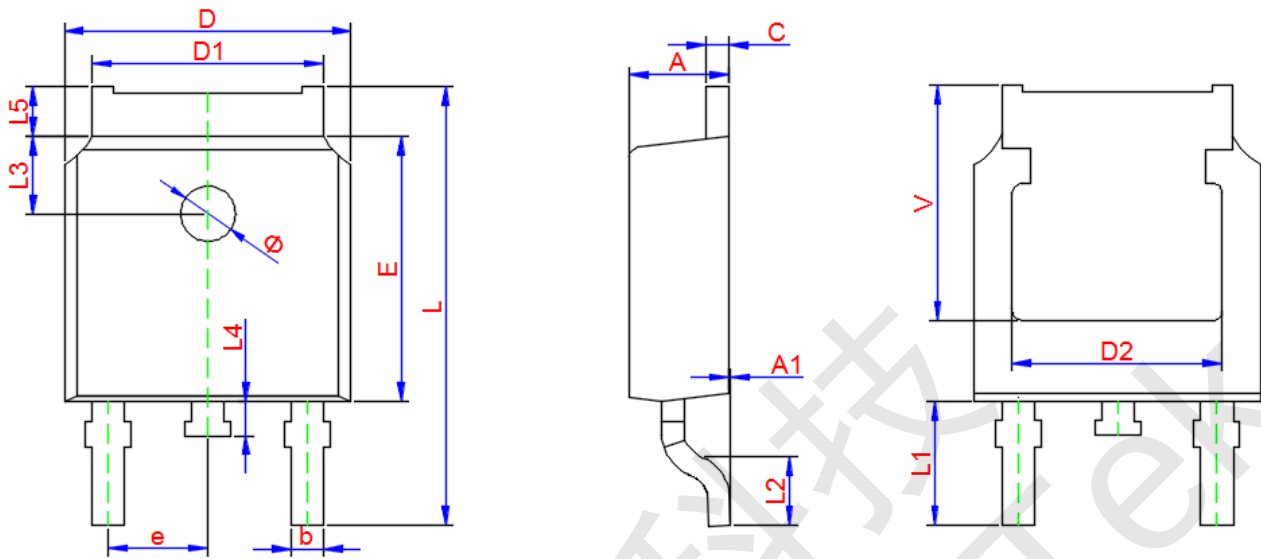


Figure 14 Normalized Maximum Transient Thermal Impedance



PE40P20K TO-252-2L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	2.200	2.300	2.400
A1	0.000	--	0.127
b	0.660	0.760	0.860
D	6.500	6.600	6.700
D1	5.100	5.330	5.460
C	0.450	0.500	0.600
D2	4.830 TYP.		
E	6.000	6.100	6.200
e	2.186	2.286	2.386
L	9.800	10.100	10.400
L1	2.900 TYP.		
L2	1.400	1.500	1.600
L3	1.800 TYP.		
L4	0.600	0.800	1.000
L5	0.900	--	1.250
Φ	1.100.	--	1.300
θ	0°	--	8°
V	5.350		