

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

Product Summary

RoHS

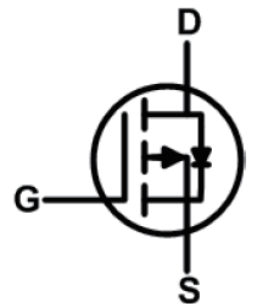
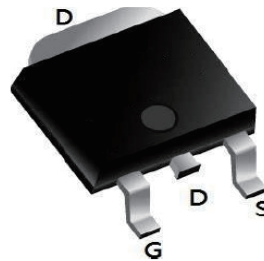
BVDSS	RDS(on)	ID
-30V	18mΩ	-35A

Description

The 40P03 is the high cell density trenched P-ch MOSFETs, which provide excellent RDS(on) and gate charge for most of the synchronous buck converter applications.

The 40P03 meet the RoHS and Green Product requirement with full function reliability approved.

TO 252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		10s	Steady State	
V _{DS}	Drain-Source Voltage	-30		V
V _{GS}	Gate-Source Voltage	±20		V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ -10V ¹	-35		A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ -10V ¹	-17		A
I _{DM}	Pulsed Drain Current ²	-8 0		A
EAS	Single Pulse Avalanche Energy ³	35		mJ
I _{AS}	Avalanche Current	-10		A
P _D @T _A =25°C	Total Power Dissipation ⁴	4		W
T _{STG}	Storage Temperature Range	-55 to 150		°C
T _J	Operating Junction Temperature Range	-55 to 150		°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ¹	---	32	°C/W

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

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250\mu A$	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -30V, V_{GS} = 0V,$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS} = \pm 20V$	-	-	± 100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}= V_{GS}, I_D = -250\mu A$	-1	-1.5	-2.5	V
$R_{DS(on)}$	Static Drain-Source on Resistance <small>Note3</small>	$V_{GS} = -10V, I_D = -9A$	-	18	25	m Ω
		$V_{GS} = -4.5V, I_D = -5A$	-	27	38	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -15V, V_{GS} = 0V,$ $f = 1.0MHz$	-	1200	-	pF
C_{oss}	Output Capacitance		-	155	-	pF
C_{riss}	Reverse Transfer Capacitance		-	139	-	pF
Q_g	Total Gate Charge	$V_{DS} = -15V, I_D = -8A,$ $V_{GS} = -10V$	-	52	-	nC
Q_{gs}	Gate-Source Charge		-	9.8	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	8.3	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = -15V, I_D = -1A,$ $V_{GS} = -10V, R_{GEN} = 6\Omega$	-	13	-	ns
t_r	Turn-on Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	198	-	ns
t_f	Turn-off Fall Time		-	98	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-35	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-80	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_S = -9A$	-	-0.8	-1.2	V

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = -15V, V_G = -10V, R_G = 25\Omega, L = 0.5mH, I_{AS} = -10A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

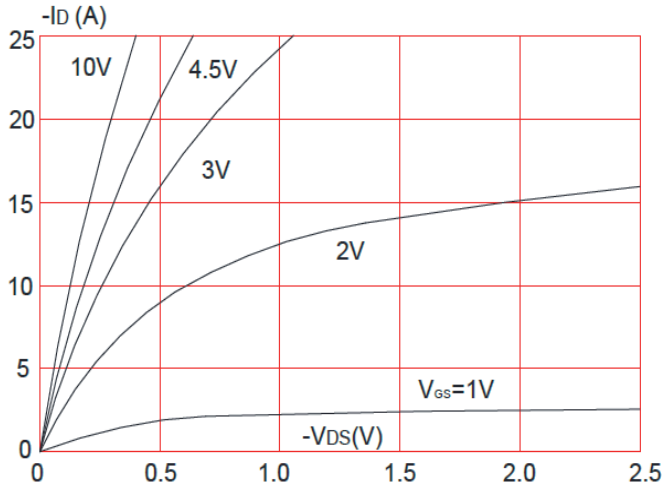


Figure 2: Typical Transfer Characteristics

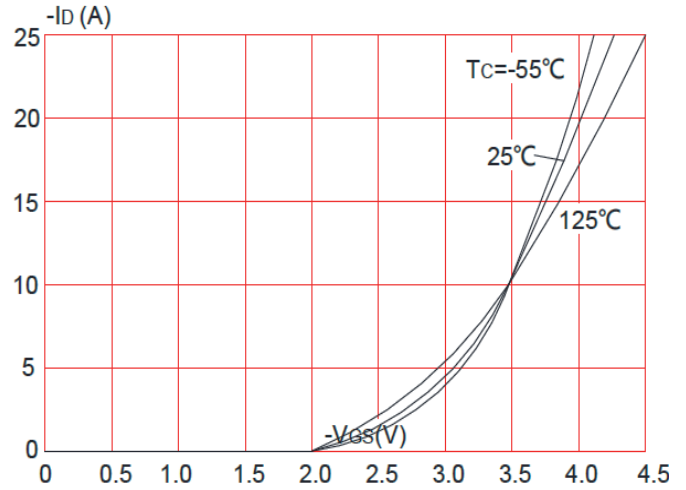


Figure 3: On-resistance vs. Drain Current

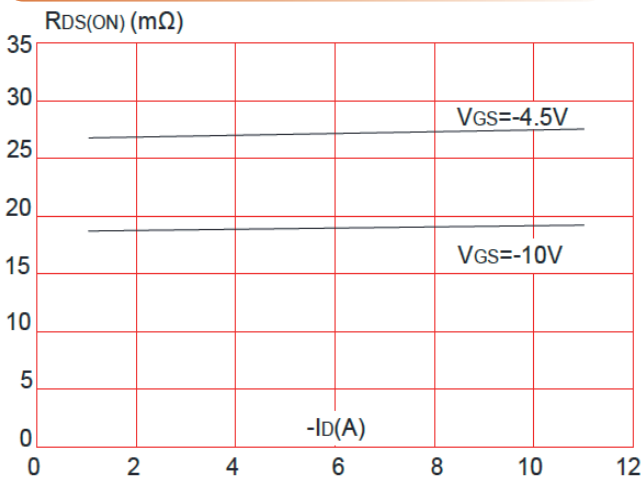


Figure 4: Body Diode Characteristics

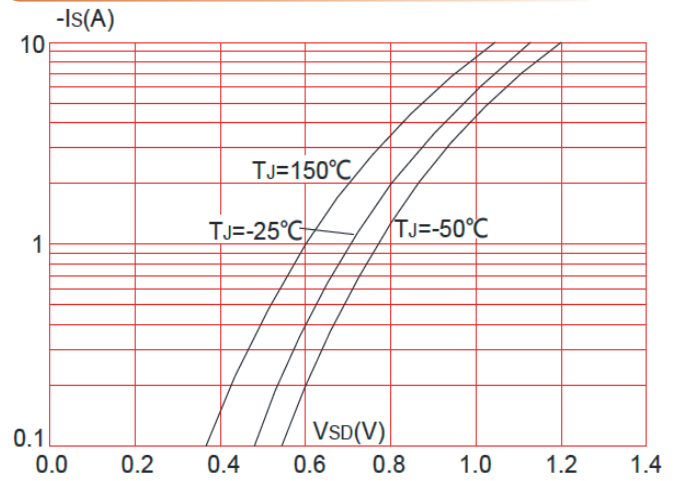


Figure 5: Gate Charge Characteristics

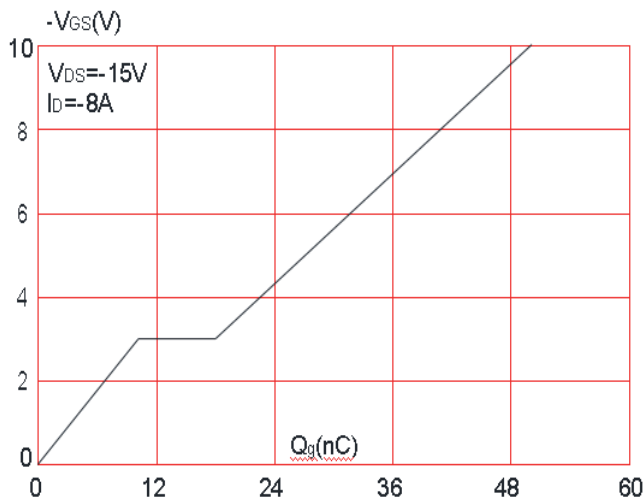
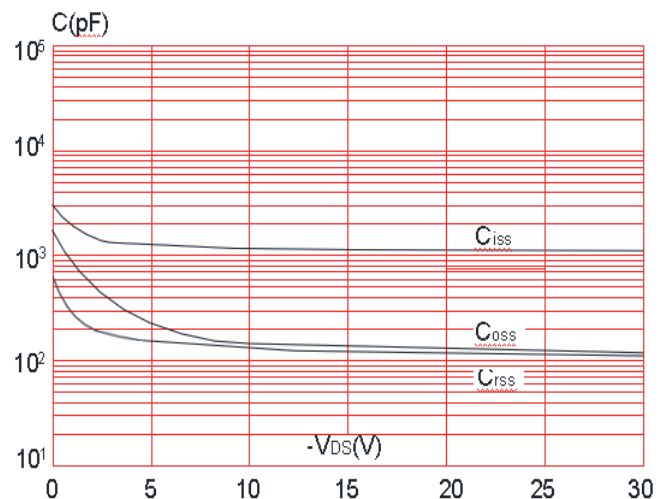


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown ure

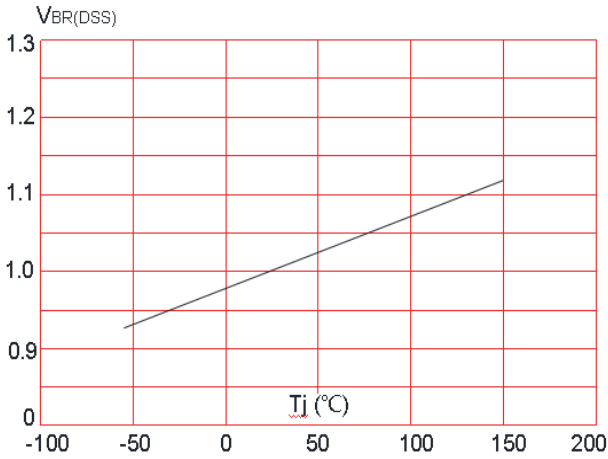


Figure 8: Normalized on Resistance vs. Junction Temperature

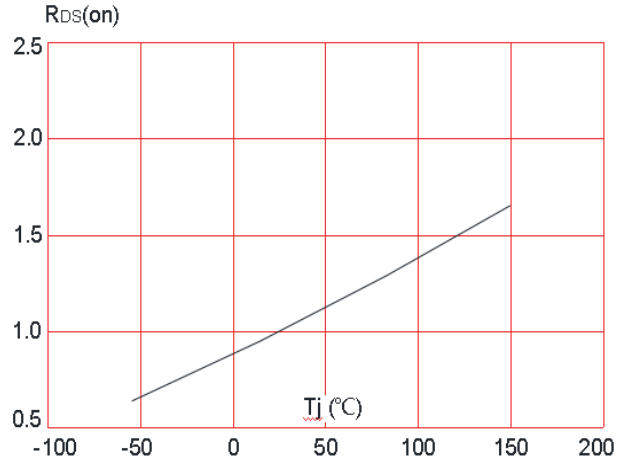


Figure 9: Maximum Safe Operating Area

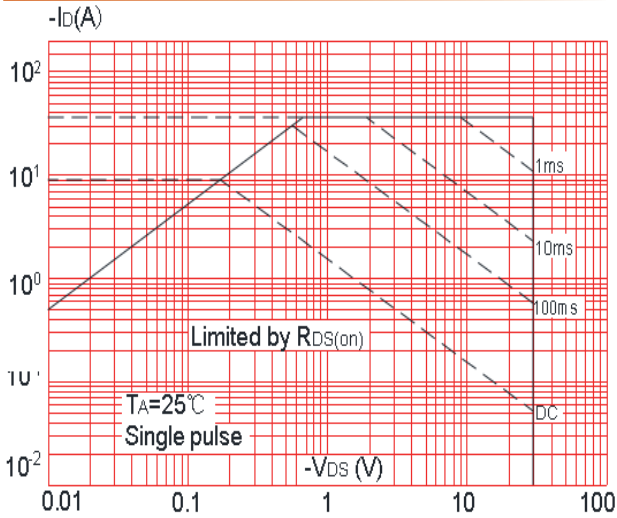


Figure 10: Maximum Continuous Drain Current

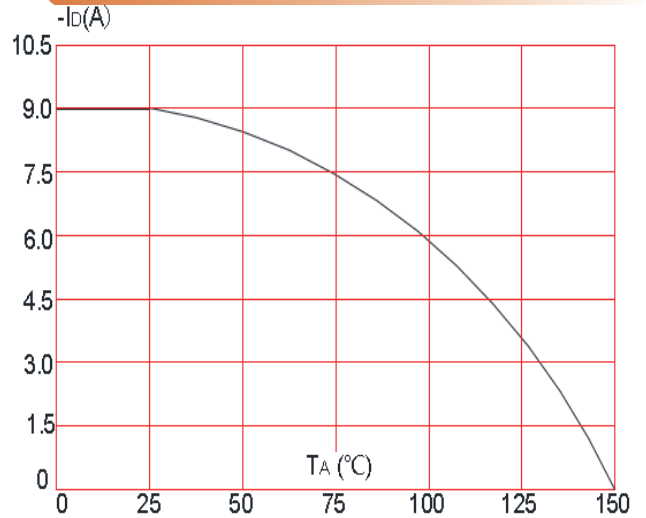
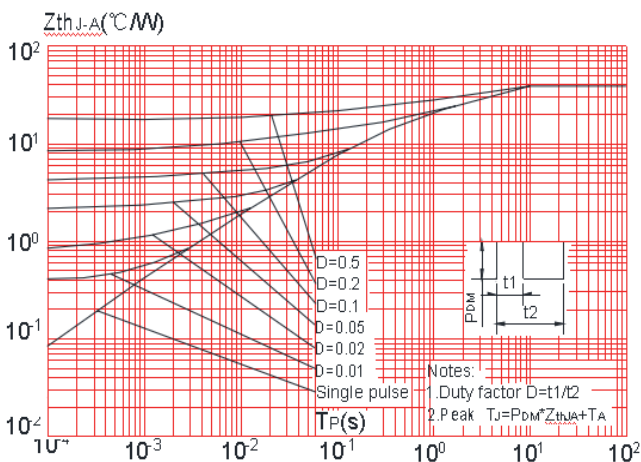
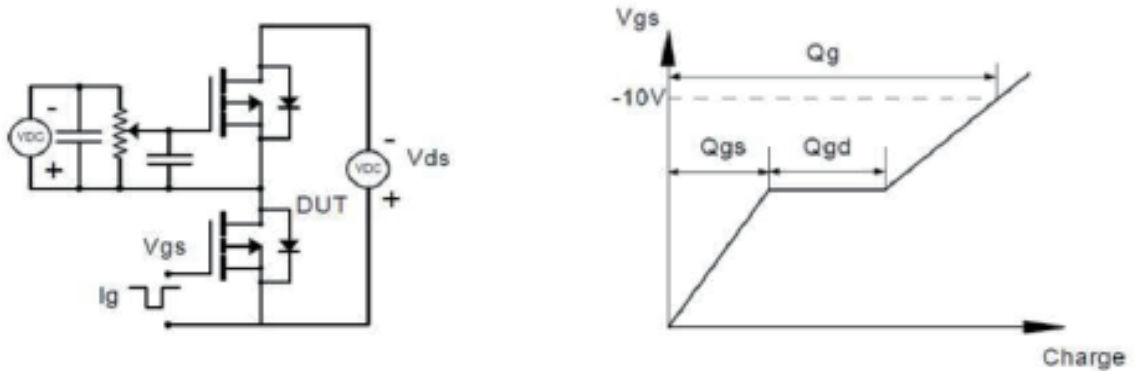


Figure 11: Maximum Effective Transient Thermal Impedance

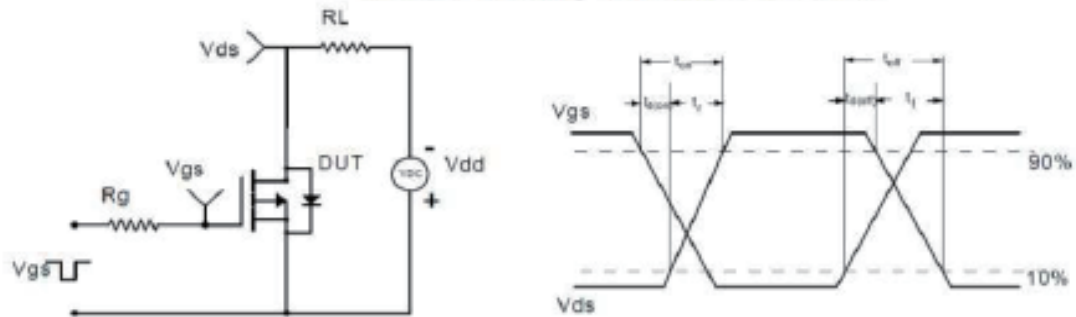


Test Circuit

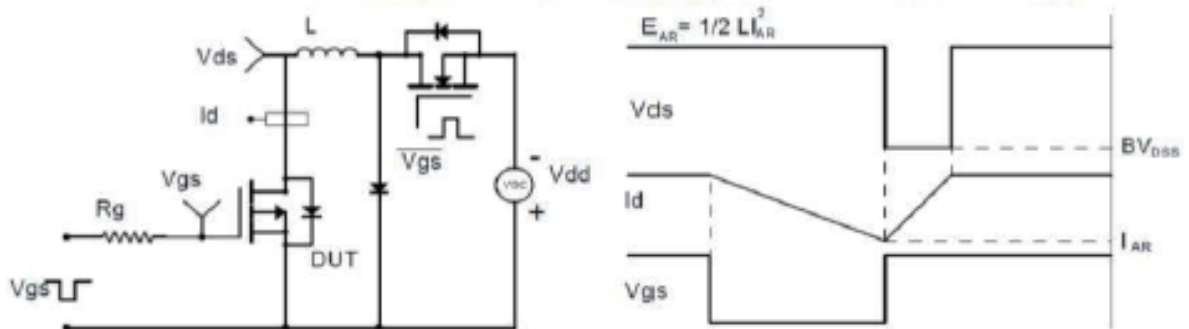
Gate Charge Test Circuit & Waveform



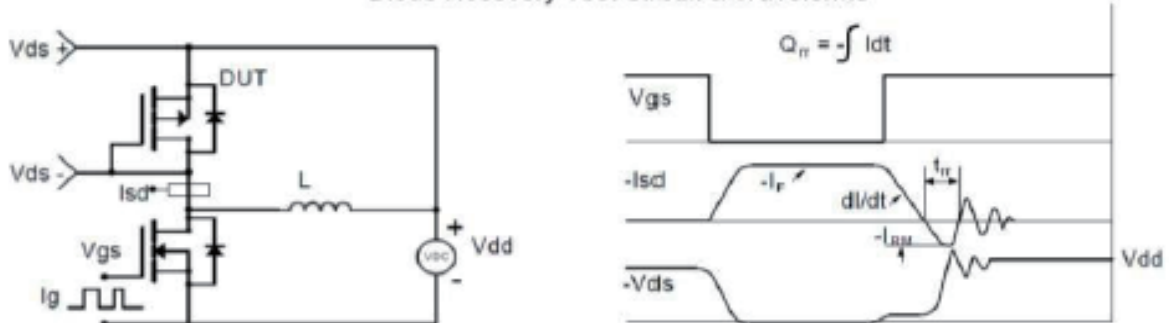
Resistive Switching Test Circuit & Waveforms



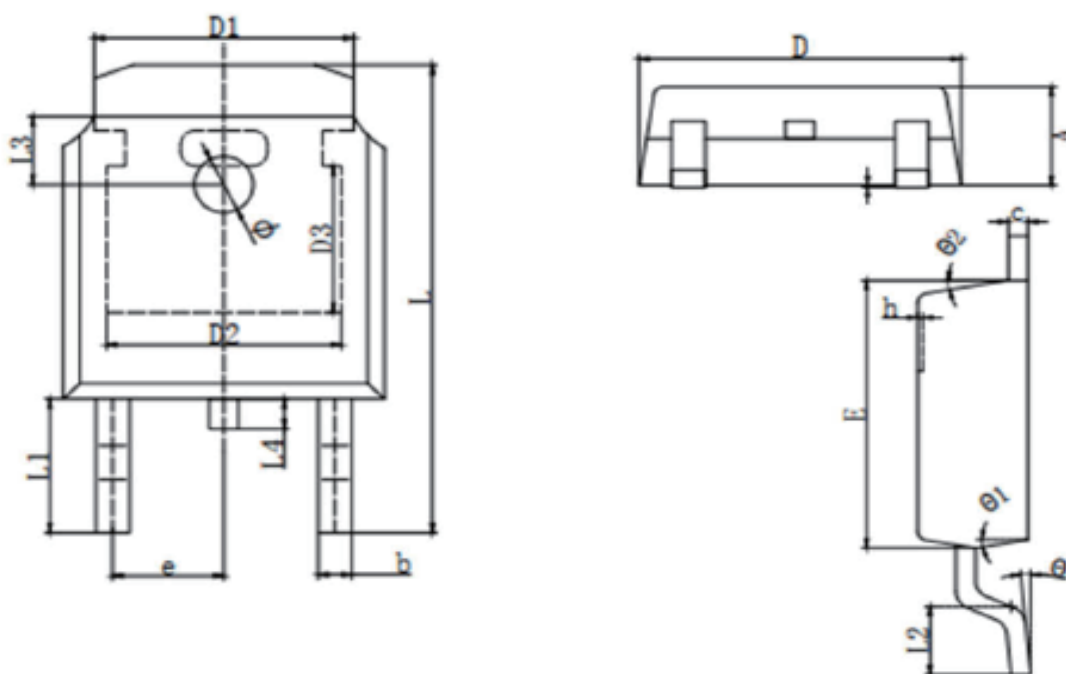
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



TO-252 Package outline



SYMBOL	MILLIMETER		SYMBOL	MILLIMETER	
	MIN	MAX		MIN	MAX
A	2.200	2.400	h	0.000	0.200
A1	0.000	0.127	L	9.900	10.30
b	0.640	0.740	L1	2.888 REF	
c	0.460	0.580	L2	1.400	1.700
D	6.500	6.700	L3	1.600 REF	
D1	5.334 REF		L4	0.600	1.000
D2	4.826 REF		ϕ	1.100	1.300
D3	3.166 REF		θ	0°	8°
E	6.000	6.200	$\theta 1$	9° TYP2	
e	2.286 TYP		$\theta 2$	9° TYP	