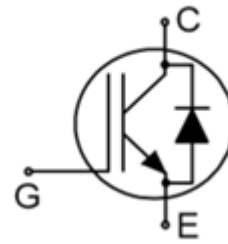


## Trench Field-Stop Technology IGBT

### Features

- 650V, 75A
- $V_{CE(sat)(typ.)} = 1.8V @ V_{GE} = 15V, I_C = 75A$
- Low Switching Losses
- Low switching surge and noise
- Low EMI



### Applications

- Solar Converters
- Uninterrupted Power Supply
- Energy Storage
- Welding machine
- EV Charger

Order codes	$V_{CE}$	$I_C$	$V_{CEsat}, T_{vj}=25^{\circ}C$	$T_{vjmax}$	Marking	Package
XD075H065A1S7-A	650V	75A	1.8V	175°C	D75H065A1A	TO247IPS-3

### Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage	650	V
$V_{GES}$	Gate-Emitter Voltage	$\pm 30$	V
$I_C$	Continuous Collector Current ( $T_C=25^{\circ}C$ )	115	A
	Continuous Collector Current ( $T_C=100^{\circ}C$ )	75	A
$I_{CM}$	Pulsed Collector Current (Note 1)	300	A
$I_F$	Diode Continuous Forward Current ( $T_C=25^{\circ}C$ )	115	A
	Diode Continuous Forward Current ( $T_C=100^{\circ}C$ )	75	A
$P_D$	Maximum Power Dissipation (IGBT)	420	W
	Maximum Power Dissipation (FWD)	375	W
$T_J$	Operating Junction Temperature Range	-40 to 175	$^{\circ}C$
$T_{STG}$	Storage Temperature Range	-55 to 175	$^{\circ}C$

### Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	50	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case for IGBT	0.35	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance, Junction to Case for Diodes	0.8	$^{\circ}C/W$

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=500\mu A$	650	---	---	V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{CE}=650V, V_{GE}=0V$	---	---	200	$\mu A$
$I_{GES}$	Gate Leakage Current, Forward	$V_{GE}=20V, V_{CE}=0V$	---	---	200	nA
	Gate Leakage Current, Reverse	$V_{GE}=-20V, V_{CE}=0V$	---	---	-200	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	5.0	5.8	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=75A$	---	1.8	2.25	V
$Q_G$	Total Gate Charge	$V_{CC}=520V, V_{GE}=15V$ $I_C=75A$	---	330	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=\pm 15V$ $I_C=75A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	---	80	---	ns
$t_r$	Turn-on Rise Time		---	33	---	ns
$t_{d(off)}$	Turn-off Delay Time		---	150	---	ns
$t_f$	Turn-off Fall Time		---	85	---	ns
$E_{on}$	Turn-on Switching Loss		---	0.7	---	mJ
$E_{off}$	Turn-off Switching Loss		---	0.97	---	mJ
$E_{ts}$	Total Switching Loss		---	1.67	---	mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V$	---	9600	---	pF
$C_{oes}$	Output Capacitance	$V_{GE}=0V$	---	310	---	pF
$C_{res}$	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	100	---	pF

**Diode Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_F$	Diode Forward Voltage	$I_F=75A$	---	1.5	3.0	V
$t_{rr}$	Diode Reverse Recovery Time	$V_{CE}=400V$ $I_F=75A$ $di_F/dt=500A/\mu s$	---	107	---	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		---	17.1	---	A
$Q_{rr}$	Diode Reverse Recovery Charge		---	1.1	---	$\mu C$

Note 1: Repetitive Rating: Pulse width limited by maximum junction temperature

## Typical Characteristics

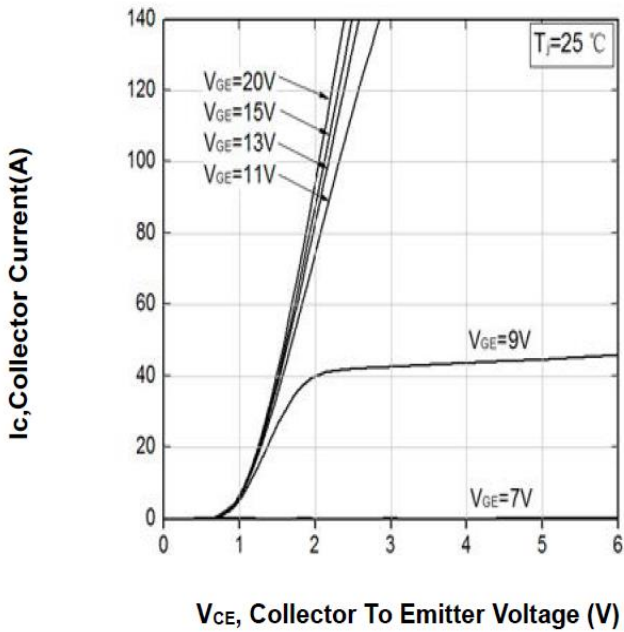


Fig. 1 Typical IGBT Output Characteristics at  $T_J=25^\circ\text{C}$

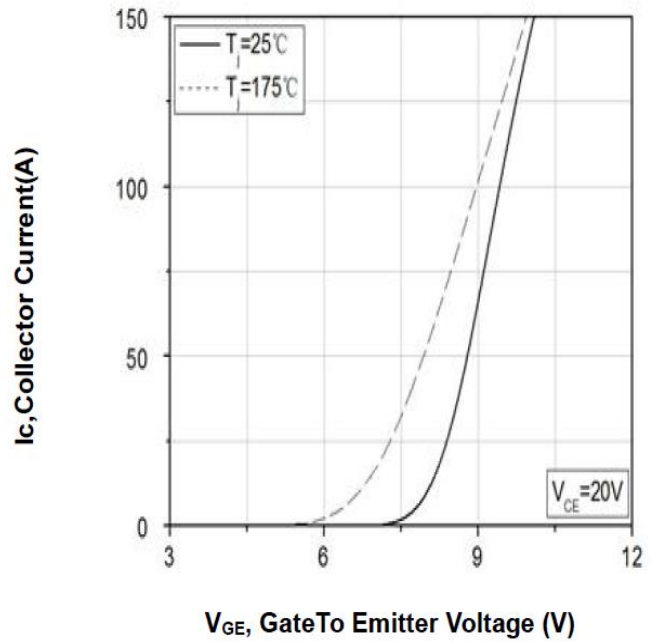


Fig. 2 Typical Transfer Characteristics at  $V_{CE}=20\text{V}$

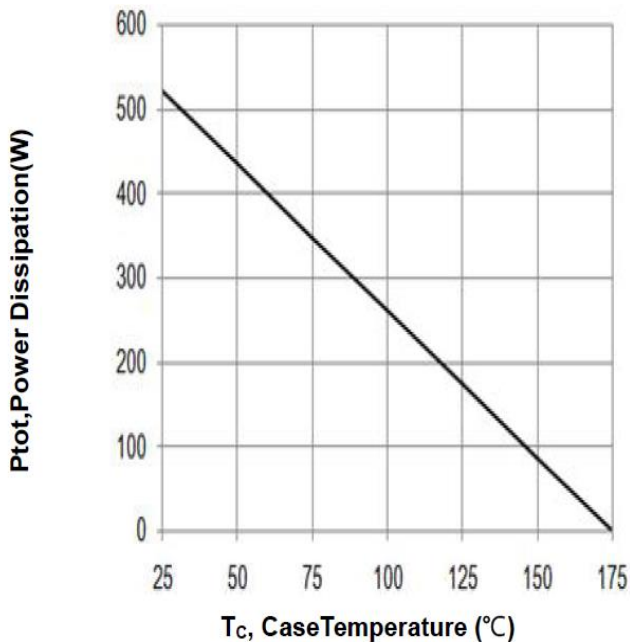


Fig. 3 Power dissipation vs. case temperature ( $T_{vj} \leq 175^\circ\text{C}$ )

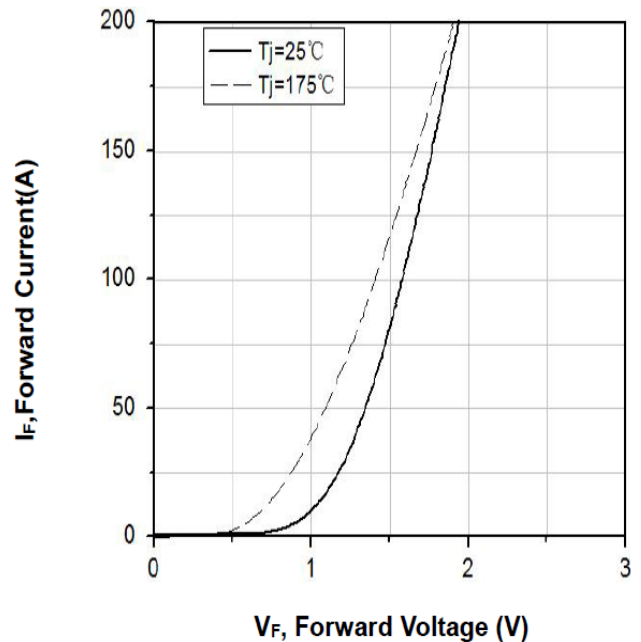


Fig. 4 Forward characteristic of Diode-Inverter

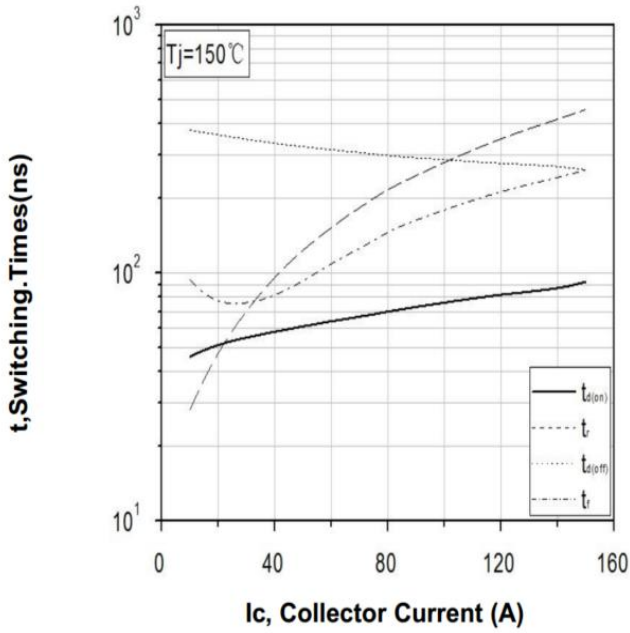


Fig. 5 Typical switching times vs. collector current (Ind. load,  $T_j=150^{\circ}\text{C}$ ,  $V_{CE}=400\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $R_g=12\ \Omega$ )

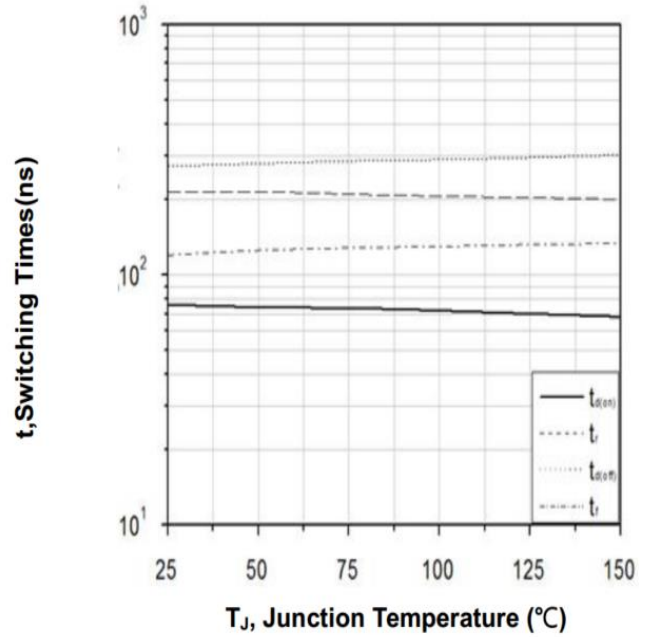


Fig. 6 Typical switching times vs.  $T_{vj}$  (Ind. Load,  $V_{CE}=400\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $I_C=75\text{A}$ ,  $R_g=10\ \Omega$ )

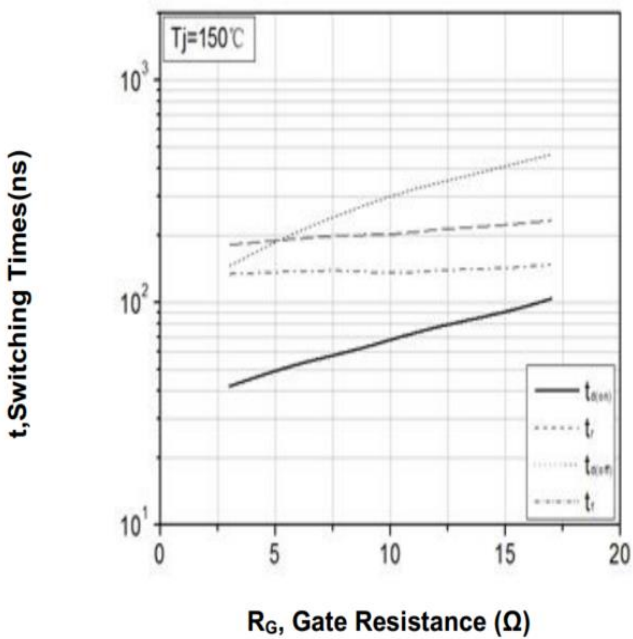


Fig. 7 Typical switching times vs. gate resistor (Ind. Load,  $T_j=150^{\circ}\text{C}$ ,  $V_{CE}=400\text{V}$ ,  $V_{GE}=15/0\text{V}$ ,  $I_C=75\text{A}$ )

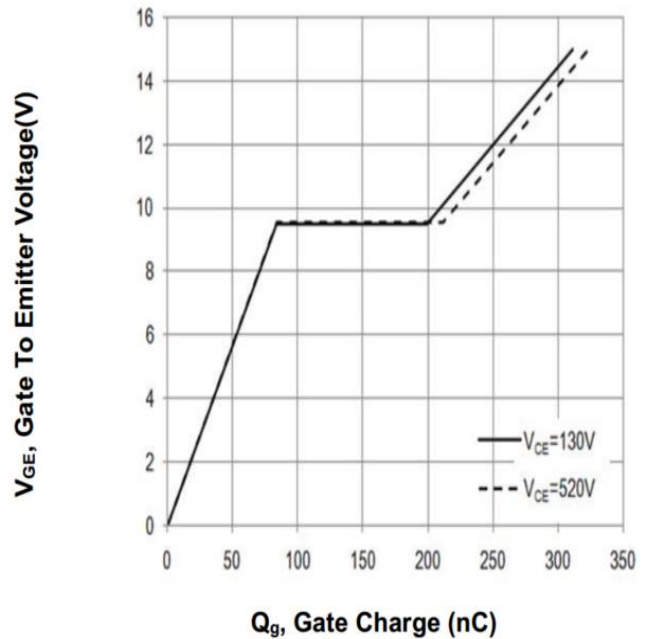


Fig. 8 Typical gate charge ( $I_C=75\text{A}$ )

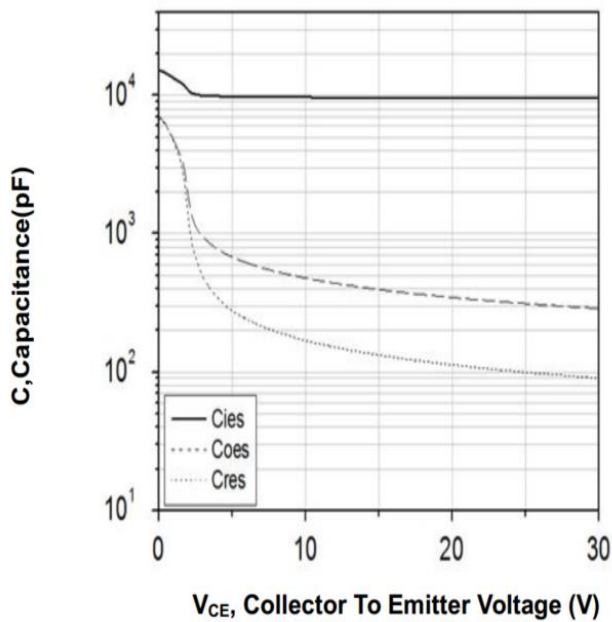


Fig. 9 Typical capacitance vs. collector-emitter voltage (V<sub>GE</sub>=0V, f=1MHz)

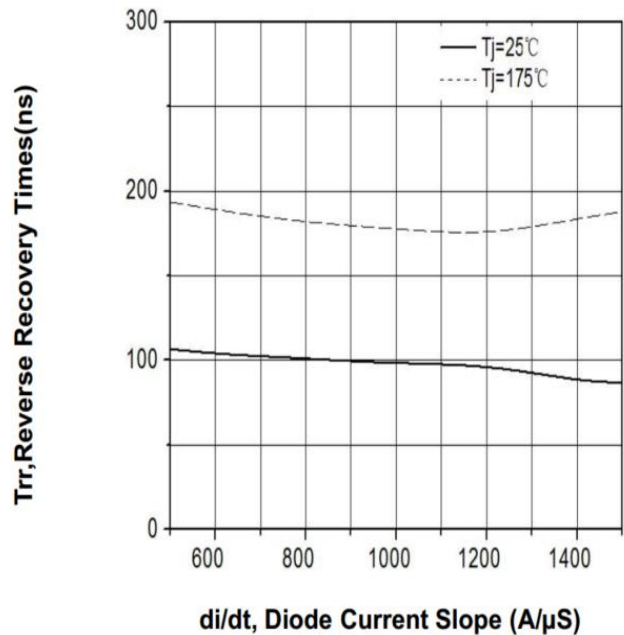


Fig. 10 Typical reverse recovery time vs. diode current slope (V<sub>R</sub>=400V)

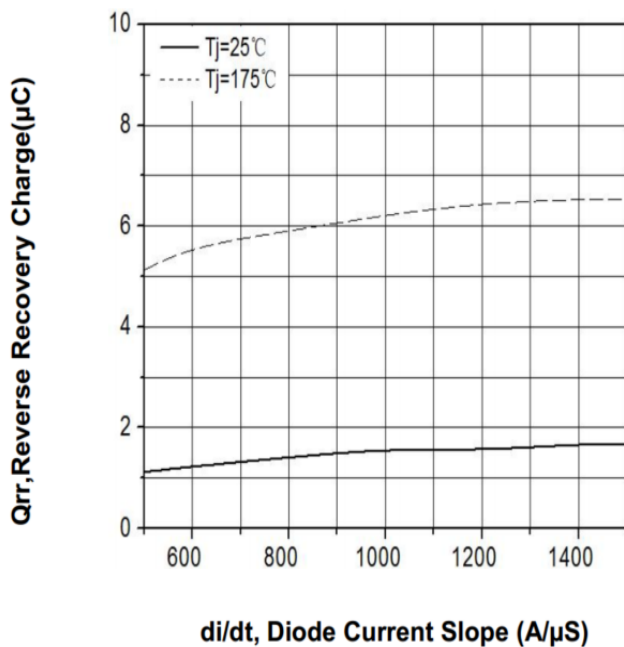


Fig. 11 Typical reverse recovery charge vs. diode current slope (V<sub>R</sub>=400V)

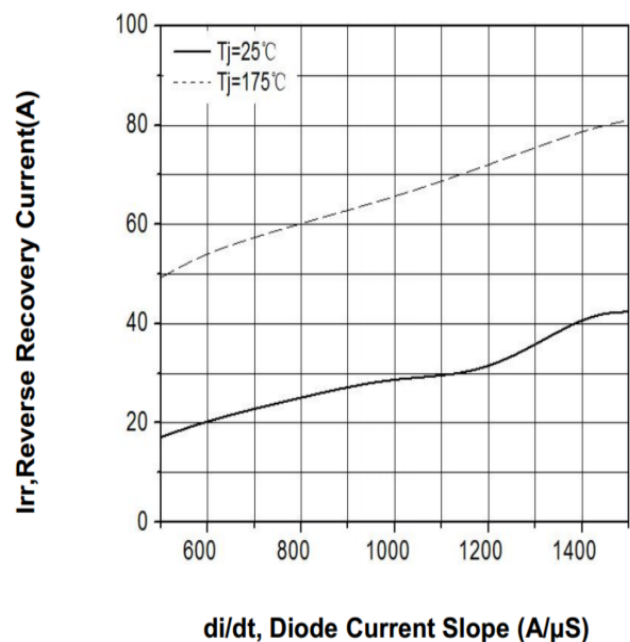
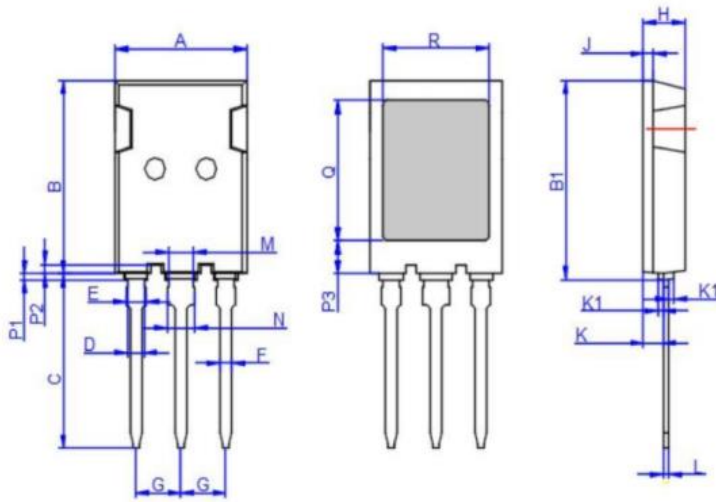


Fig. 12 Typical reverse recovery current vs. diode current slope (V<sub>R</sub>=400V)

# Package Information

TO-247iPS-3



TO-247iPS-3L

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.70	16.00	16.30	0.618	0.630	0.642
B	21.80	22.00	22.20	0.858	0.866	0.874
B1	22.30	22.50	22.70	0.878	0.886	0.894
C	19.40	19.70	20.00	0.764	0.776	0.787
D	1.80	2.00	2.20	0.071	0.079	0.087
E	2.15	2.35	2.55	0.085	0.093	0.100
F	1.16	1.36	1.56	0.046	0.054	0.061
G	5.25	5.45	5.65	0.207	0.215	0.222
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.10	1.20	1.30	0.043	0.047	0.051
K	2.20	2.35	2.50	0.087	0.093	0.098
K1	0.45	0.60	0.75	0.018	0.024	0.030
L	0.51	0.70	0.89	0.020	0.028	0.035
M	2.80	3.00	3.20	0.110	0.118	0.126
N	3.15	3.35	3.55	0.124	0.132	0.140
P1	0.44	0.64	0.84	0.017	0.025	0.033
P2	0.80	1.00	1.20	0.031	0.039	0.047
P3	3.55	3.75	3.95	0.140	0.148	0.156
Q	12.60	12.90	13.20	0.496	0.508	0.520
R	15.55	15.85	16.15	0.612	0.624	0.636