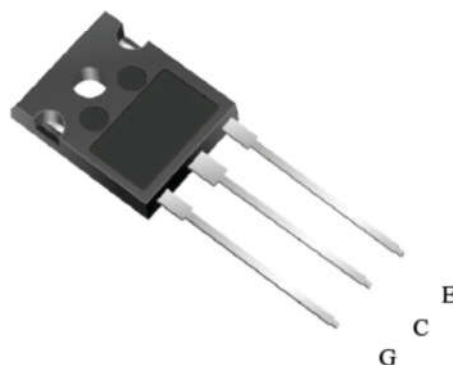
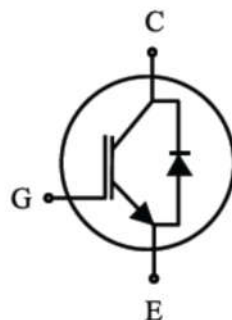


## 1200V /25A Trench Field Stop IGBT

- High breakdown voltage to 1200V for improved reliability
- Trench-Stop Technology offering :
  - High speed switching
  - High ruggedness, temperature stable
  - Low  $V_{CEsat}$
  - Easy parallel switching capability due to positive temperature coefficient in  $V_{CEsat}$
- Enhanced avalanche capability

|                         |      |   |
|-------------------------|------|---|
| $V_{CE}$                | 1200 | V |
| $I_C$                   | 25   | A |
| $V_{CE(sat)}$ $I_C=25A$ | 2.0  | V |



## APPLICATION

- Uninterruptible Power Supplies
- Solar inverter
- Welding
- PFC applications

## Ordering Information

| Product           | Package | Packaging |
|-------------------|---------|-----------|
| SPT25N120F1A1T8TL | TO-247  | Tube      |



## Maximum Ratings

| Parameter                                                                                   | Symbol   | Value      | Unit        |
|---------------------------------------------------------------------------------------------|----------|------------|-------------|
| Collector-Emitter Breakdown Voltage                                                         | $V_{CE}$ | 1200       | V           |
| DC collector current, limited by $T_{jmax}$<br>$T_C = 25^{\circ}C$<br>$T_C = 100^{\circ}C$  | $I_C$    | 50<br>25   | A           |
| Diode Forward current, limited by $T_{jmax}$<br>$T_C = 25^{\circ}C$<br>$T_C = 100^{\circ}C$ | $I_F$    | 50<br>25   | A           |
| Turn off safe operating area $V_{CE} \leq 1350V$ ,<br>$T_j \leq 150^{\circ}C$               | -        | 50         | A           |
| Operating junction temperature $T_j$                                                        | -        | -40...+150 | $^{\circ}C$ |
| Storage temperature                                                                         | $T_s$    | -55...+150 | $^{\circ}C$ |
| Soldering temperature, wave soldering 1.6mm<br>(0.063in.) from case for 10s                 | -        | 260        | $^{\circ}C$ |

## Thermal Resistance

| Parameter                                    | Symbol            | Max. Value | Unit |
|----------------------------------------------|-------------------|------------|------|
| IGBT thermal resistance,<br>junction - case  | $R_{\theta(j-c)}$ | 0.48       | K/W  |
| Diode thermal resistance,<br>junction - case | $R_{\theta(j-c)}$ | 1.2        | K/W  |
| Thermal resistance,<br>junction - ambient    | $R_{\theta(j-a)}$ | 40         | K/W  |

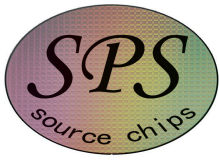
## Electrical Characteristics of the IGBT ( $T_j = 25^\circ\text{C}$ unless otherwise specified) :

| Parameter                            | Symbol        | Conditions                                                                             | Min.   | Typ.       | Max.        | Unit    |
|--------------------------------------|---------------|----------------------------------------------------------------------------------------|--------|------------|-------------|---------|
| <b>Static</b>                        |               |                                                                                        |        |            |             |         |
| Collector-Emitter breakdown voltage  | $BV_{CES}$    | $V_{GE}=0V, I_C=1mA$                                                                   | 1200   | -          | -           | V       |
| Gate threshold voltage               | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=250\mu A$                                                          | 5.1    | 5.8        | 6.4         | V       |
| Collector-Emitter Saturation voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=25A$<br>$T_j = 25^\circ\text{C}$<br>$T_j = 150^\circ\text{C}$         | -<br>- | 2.0<br>2.5 | 2.5<br>-    | V       |
| Zero gate voltage collector current  | $I_{CES}$     | $V_{CE} = 1350V, V_{GE} = 0V$<br>$T_j = 25^\circ\text{C}$<br>$T_j = 150^\circ\text{C}$ | -<br>- | <1<br>-    | 100<br>1000 | $\mu A$ |
| Gate-emitter leakage current         | $I_{GES}$     | $V_{CE} = 0V, V_{GE} = 20V$                                                            | -      | -          | 100         | nA      |

| Parameter                    | Symbol    | Conditions                                    | Min. | Typ. | Max. | Unit |
|------------------------------|-----------|-----------------------------------------------|------|------|------|------|
| <b>Dynamic</b>               |           |                                               |      |      |      |      |
| Input capacitance            | $C_{ies}$ | $V_{CE} = 25V, V_{GE} = 0V,$<br>$f = 1MHz$    | -    | 2500 | -    | pF   |
| Output capacitance           | $C_{oes}$ |                                               | -    | 70   | -    |      |
| Reverse transfer capacitance | $C_{res}$ |                                               | -    | 50   | -    |      |
| Gate charge                  | $Q_G$     | $V_{CC} = 600V, I_C = 25A,$<br>$V_{GE} = 15V$ | -    | 125  | -    | nC   |

## Switching Characteristic, Inductive Load

| Parameter                                               | Symbol       | Conditions                                                         | Min. | Typ. | Max. | Unit |
|---------------------------------------------------------|--------------|--------------------------------------------------------------------|------|------|------|------|
| <b>Dynamic , at <math>T_j = 25^\circ\text{C}</math></b> |              |                                                                    |      |      |      |      |
| Turn-on delay time                                      | $t_{d(on)}$  | $V_{CC} = 600V, I_C = 25A,$<br>$V_{GE} = 0/15V,$<br>$R_g=10\Omega$ | -    | 35   | -    | nS   |
| Rise time                                               | $t_r$        |                                                                    | -    | 32   | -    | nS   |
| Turn-on energy                                          | $E_{on}$     |                                                                    | -    | 2.0  | -    | mJ   |
| Turn-off delay time                                     | $t_{d(off)}$ |                                                                    | -    | 180  | -    | nS   |
| Fall time                                               | $t_f$        |                                                                    | -    | 40   | -    | nS   |
| Turn-off energy                                         | $E_{off}$    |                                                                    | -    | 0.32 | -    | mJ   |



# SPT25N120F1A1T8TL

## Electrical Characteristics of the DIODE ( $T_j = 25^\circ\text{C}$ unless otherwise specified)

| Parameter                | Symbol   | Conditions                                               | Min. | Typ. | Max. | Unit |
|--------------------------|----------|----------------------------------------------------------|------|------|------|------|
| <b>Dynamic</b>           |          |                                                          |      |      |      |      |
| Diode Forward Voltage    | $V_{FM}$ | $I_F = 25\text{A}$                                       | -    | 3.1  | -    | V    |
| Reverse Recovery Time    | $T_{rr}$ | $I_F = 25\text{A},$<br>$di/dt = 600\text{A}/\mu\text{s}$ | -    | 420  | -    | nS   |
| Reverse Recovery Current | $I_{rr}$ |                                                          | -    | 17   | -    | A    |
| Reverse Recovery Charge  | $Q_{rr}$ |                                                          | -    | 2570 | -    | nC   |

## IGBT Characteristics

Fig. 1 Output characteristics

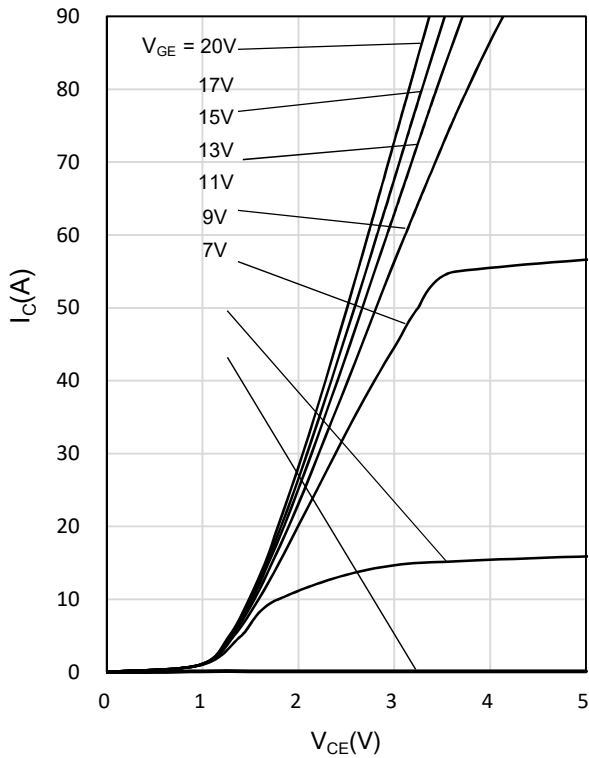


Fig. 2 Saturation voltage characteristics

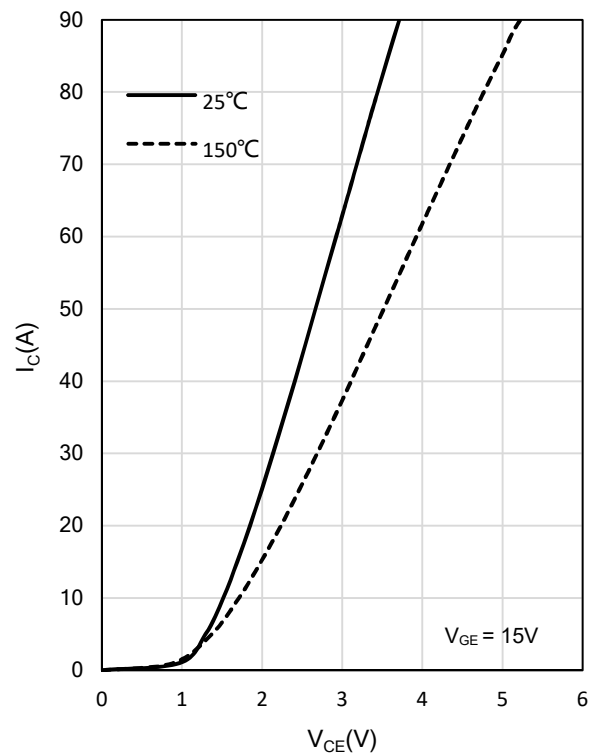


Fig. 3 Turn-off time vs. gate resistor

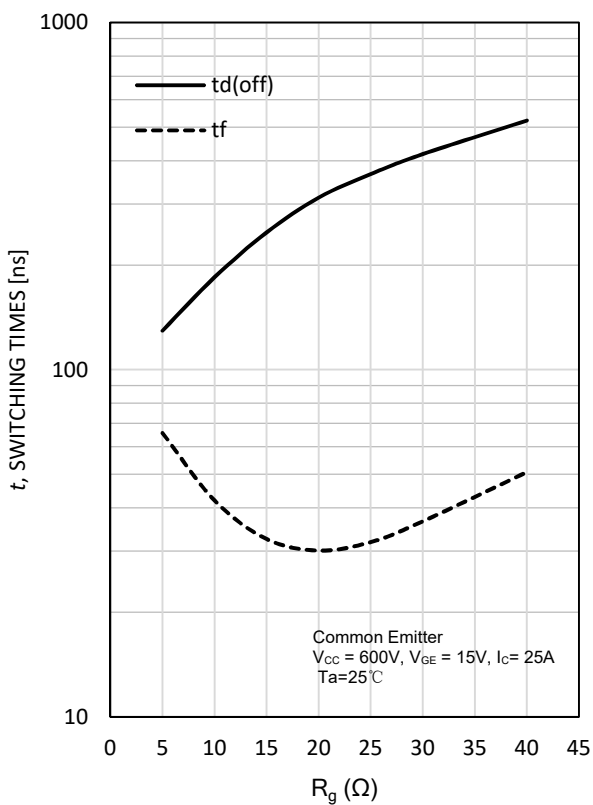
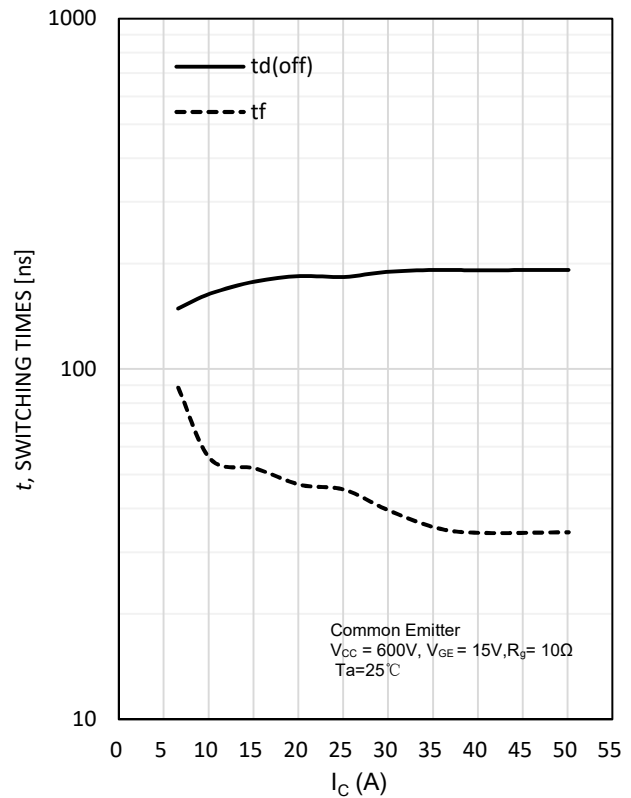


Fig. 4 Turn-off time vs. collector current



## IGBT Characteristics

Fig. 5 Switching loss vs. gate resistor

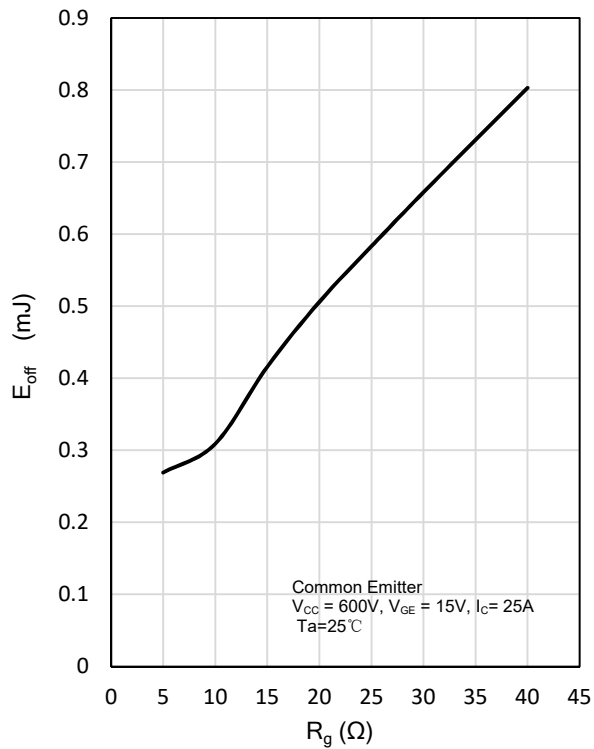


Fig. 6 Switching loss vs. collector current

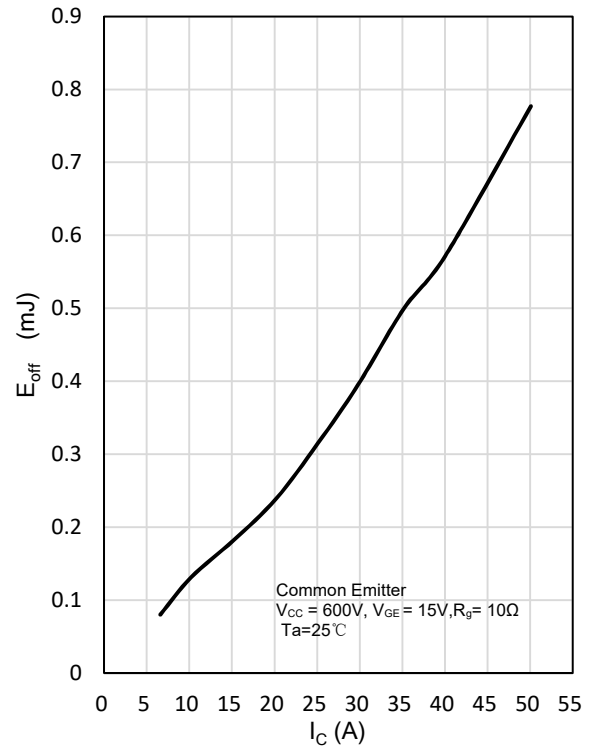


Fig. 7 Gate charge characteristics

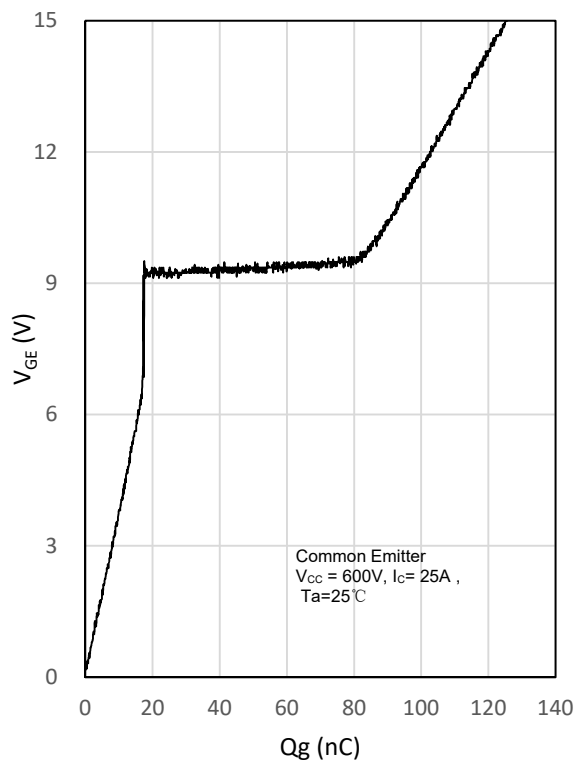
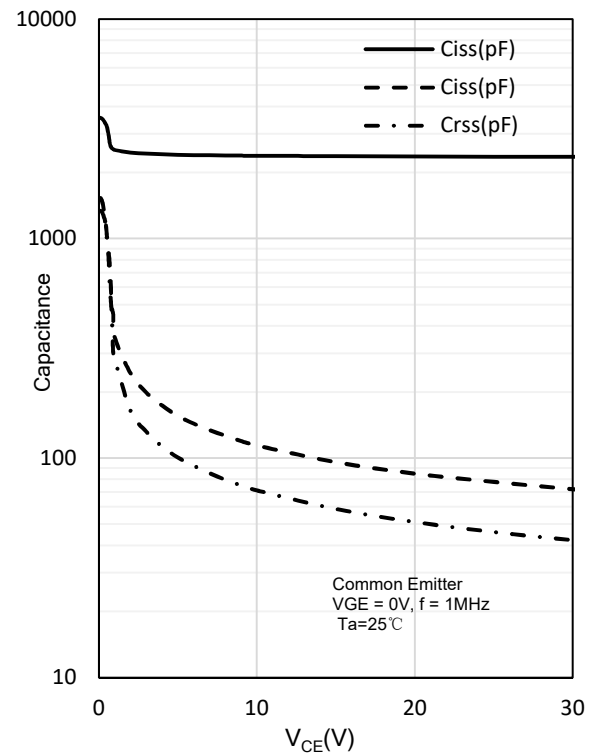
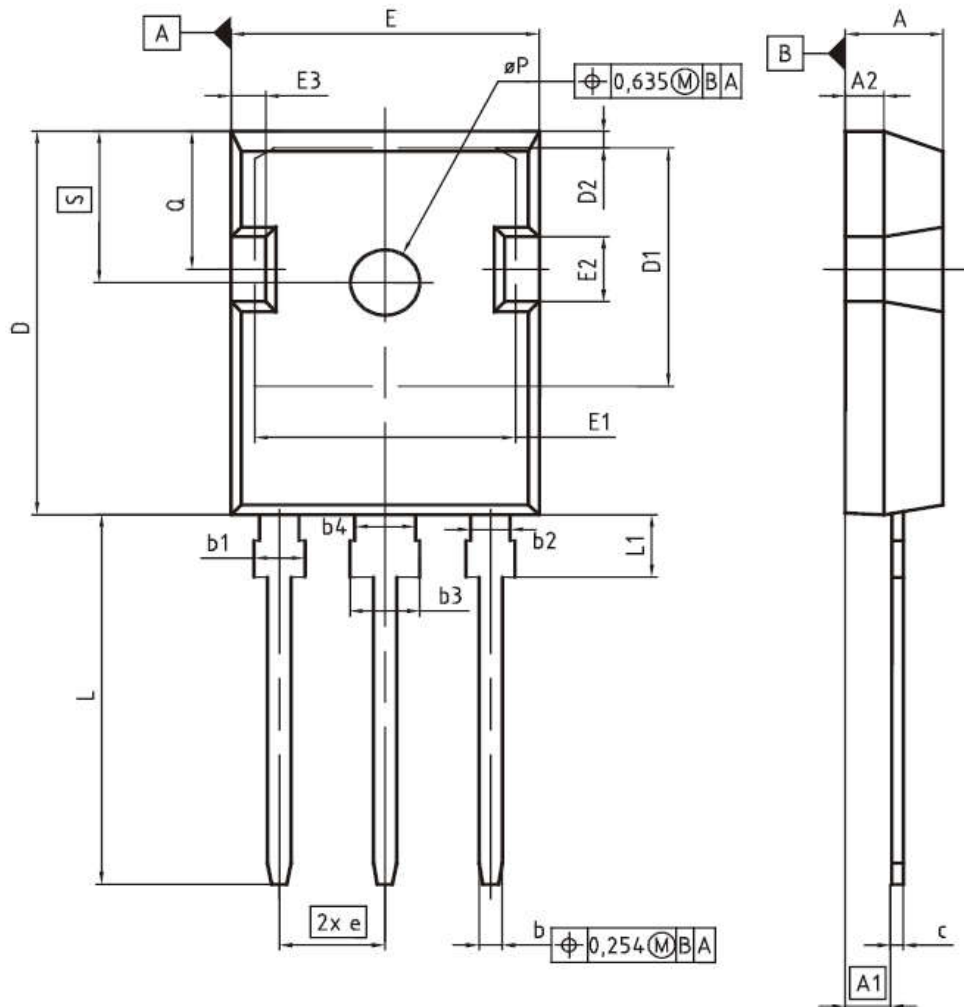


Fig. 8 Capacitance characteristics



## PG-TO247-3



| DIM | MILLIMETERS |       | INCHES      |       |
|-----|-------------|-------|-------------|-------|
|     | MIN         | MAX   | MIN         | MAX   |
| A   | 4.83        | 5.21  | 0.190       | 0.205 |
| A1  | 2.27        | 2.54  | 0.089       | 0.100 |
| A2  | 1.85        | 2.16  | 0.073       | 0.085 |
| b   | 1.07        | 1.33  | 0.042       | 0.052 |
| b1  | 1.90        | 2.41  | 0.075       | 0.095 |
| b2  | 1.90        | 2.16  | 0.075       | 0.085 |
| b3  | 2.87        | 3.38  | 0.113       | 0.133 |
| b4  | 2.87        | 3.13  | 0.113       | 0.123 |
| c   | 0.55        | 0.68  | 0.022       | 0.027 |
| D   | 20.80       | 21.10 | 0.819       | 0.831 |
| D1  | 16.25       | 17.65 | 0.640       | 0.695 |
| D2  | 0.95        | 1.35  | 0.037       | 0.053 |
| E   | 15.70       | 16.13 | 0.618       | 0.635 |
| E1  | 13.10       | 14.15 | 0.516       | 0.557 |
| E2  | 3.68        | 5.10  | 0.145       | 0.201 |
| E3  | 1.00        | 2.60  | 0.039       | 0.102 |
| e   | 5.44 (BSC)  |       | 0.214 (BSC) |       |
| N   | 3           |       | 3           |       |
| L   | 19.80       | 20.32 | 0.780       | 0.800 |
| L1  | 4.10        | 4.47  | 0.161       | 0.176 |
| øP  | 3.50        | 3.70  | 0.138       | 0.146 |
| Q   | 5.49        | 6.00  | 0.216       | 0.236 |
| S   | 6.04        | 6.30  | 0.238       | 0.248 |