

## TMT1906P / TMB1906B N-CHANNEL POWER MOSFET

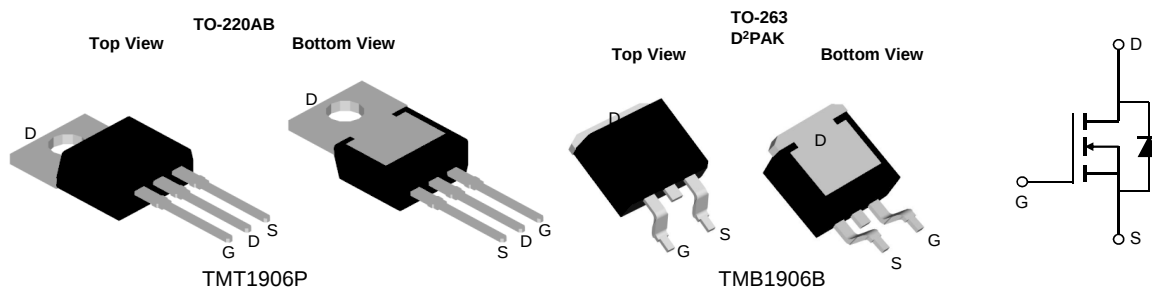
### General Description

- Power Management for Inverter Systems.

### Product Summary

- 60V / 120 A,  
 $R_{DS(ON)} = 6.0 \text{ m}\Omega$  (typ.) @  $V_{GS}=10\text{V}$
- Avalanche Rated
- Reliable and Rugged
- Lead Free and Green Devices Available  
(RoHS Compliant)

100% UIS Tested  
100%  $R_g$  Tested



### Absolute Maximum Ratings

| Symbol                                                       | Parameter                              |                       | Rating     | Unit |
|--------------------------------------------------------------|----------------------------------------|-----------------------|------------|------|
| Common Ratings (T <sub>C</sub> =25°C Unless Otherwise Noted) |                                        |                       |            |      |
| V <sub>DSS</sub>                                             | Drain-Source Voltage                   |                       | 60         | V    |
| V <sub>GSS</sub>                                             | Gate-Source Voltage                    |                       | ±25        |      |
| T <sub>J</sub>                                               | Maximum Junction Temperature           |                       | 175        | °C   |
| T <sub>STG</sub>                                             | Storage Temperature Range              |                       | -55 to 175 | °C   |
| I <sub>S</sub>                                               | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 120        | A    |
| Mounted on Large Heat Sink                                   |                                        |                       |            |      |
| I <sub>DM</sub>                                              | Pulsed Drain Current *                 | T <sub>C</sub> =25°C  | 380**      | A    |
| I <sub>D</sub>                                               | Continuous Drain Current               | T <sub>C</sub> =25°C  | 120        | A    |
|                                                              |                                        | T <sub>C</sub> =100°C | 80         |      |
| P <sub>D</sub>                                               | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 188        | W    |
|                                                              |                                        | T <sub>C</sub> =100°C | 94         |      |
| R <sub>θJC</sub>                                             | Thermal Resistance-Junction to Case    |                       | 0.8        | °C/W |
| R <sub>θJA</sub>                                             | Thermal Resistance-Junction to Ambient |                       | 62.5       |      |
| Avalanche Ratings                                            |                                        |                       |            |      |
| E <sub>AS</sub>                                              | Avalanche Energy, Single Pulsed        | L=0.5mH               | 600***     | mJ   |

Note : \* Repetitive rating ; pulse width limited by junction temperature

\*\* Drain current is limited by junction temperature

\*\*\*  $V_D=48\text{V}$

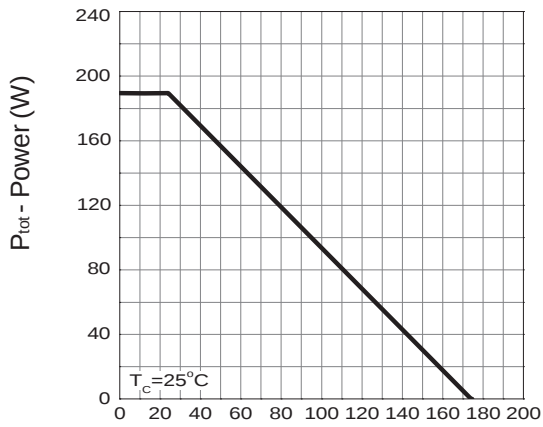
## Electrical Characteristics (T<sub>c</sub> = 25°C Unless Otherwise Noted)

| Symbol                                   | Parameter                        | Test Conditions                                                                         | 1906 |      |      | Unit |
|------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------|------|------|------|------|
|                                          |                                  |                                                                                         | Min. | Typ. | Max. |      |
| Static Characteristics                   |                                  |                                                                                         |      |      |      |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                             | 60   | -    | -    | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                               | -    | -    | 1    | μA   |
|                                          |                                  | T <sub>J</sub> =85°C                                                                    | -    | -    | 10   |      |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                               | 2    | 3    | 4    | V    |
| I <sub>GSS</sub>                         | Gate Leakage Current             | V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V                                              | -    | -    | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>*</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =60A                                              | -    | 6.0  | 7.5  | mΩ   |
| Diode Characteristics                    |                                  |                                                                                         |      |      |      |      |
| V <sub>SD</sub> <sup>*</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =60A, V <sub>GS</sub> =0V                                               | -    | 0.8  | 1.2  | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =60A, dI <sub>SD</sub> /dt=100A/μs                                      | -    | 50   | -    | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                         | -    | 95   | -    | nC   |
| Dynamic Characteristics                  |                                  |                                                                                         |      |      |      |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                        | -    | 1.0  | -    | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, Frequency=1.0MHz                             | -    | 4577 | -    | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                         | -    | 876  | -    |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                         | -    | 276  | -    |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =30V, R <sub>G</sub> = 6 Ω, I <sub>DS</sub> =60A, V <sub>GS</sub> =10V, | -    | 13   | 26   | ns   |
| T <sub>r</sub>                           | Turn-on Rise Time                |                                                                                         | -    | 11   | 20   |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                         | -    | 40   | 66   |      |
| T <sub>f</sub>                           | Turn-off Fall Time               |                                                                                         | -    | 60   | 95   |      |
| Gate Charge Characteristics <sup>b</sup> |                                  |                                                                                         |      |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>DS</sub> =60A                        | -    | 96   | -    | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                         | -    | 21   | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                         | -    | 23   | -    |      |

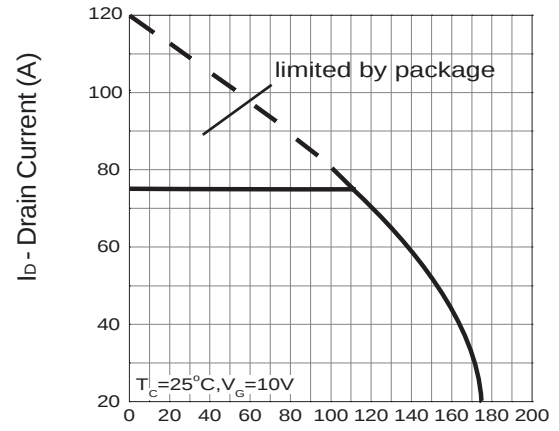
Note \* : Pulse test ; pulse width ≤300μs, duty cycle ≤2%.

# Typical Operating Characteristics

Power Dissipation



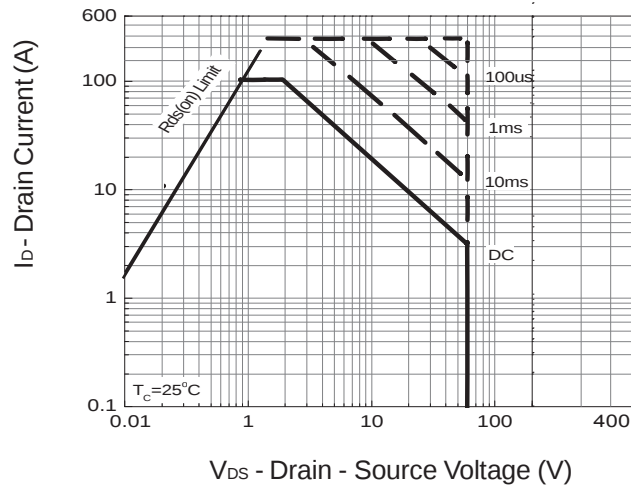
Drain Current



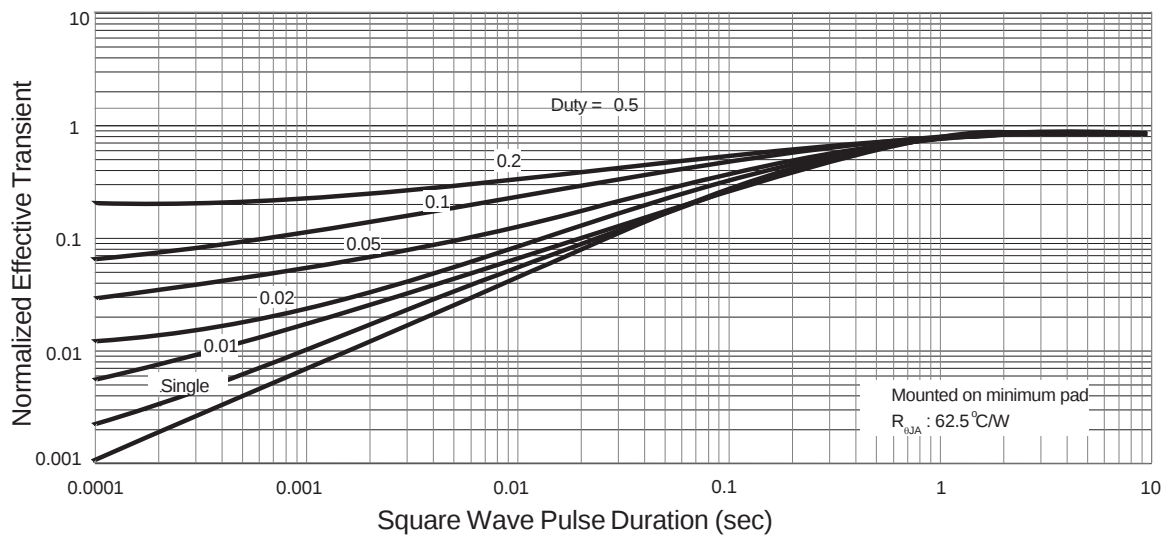
$T_c$  - Case Temperature ( $^{\circ}C$ )

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Safe Operation Area

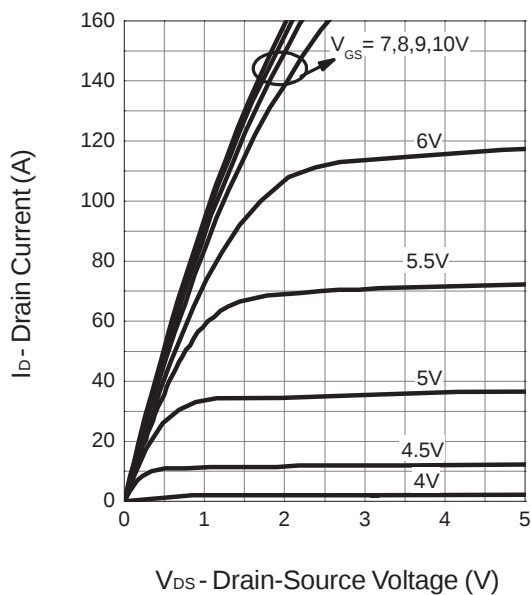


Thermal Transient Impedance

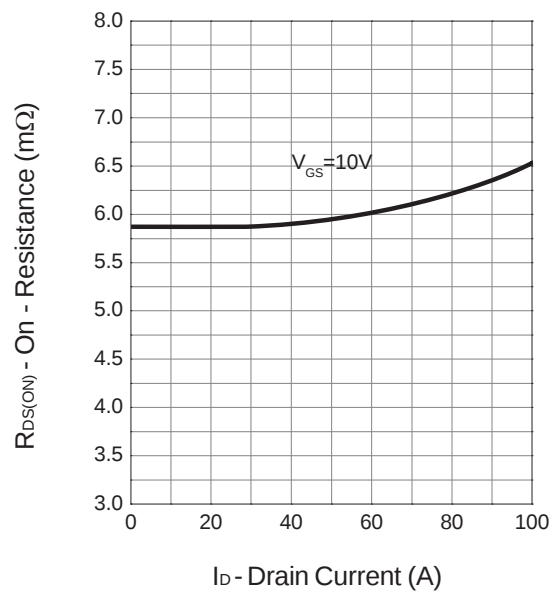


## Typical Operating Characteristics (Cont.)

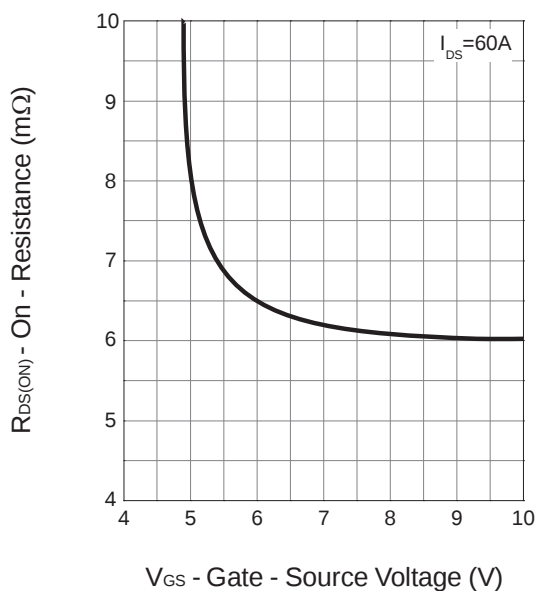
Output Characteristics



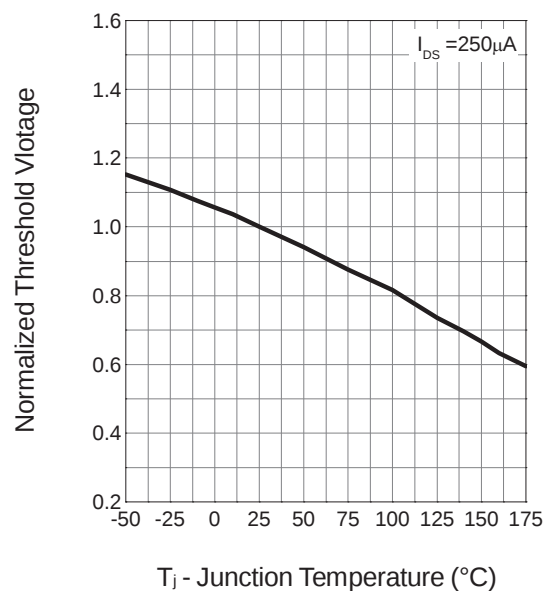
Drain-Source On Resistance



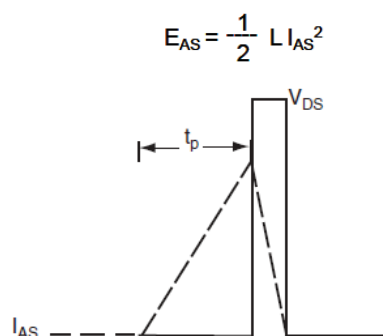
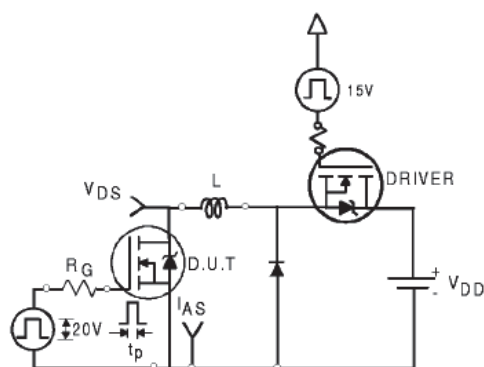
Drain-Source On Resistance



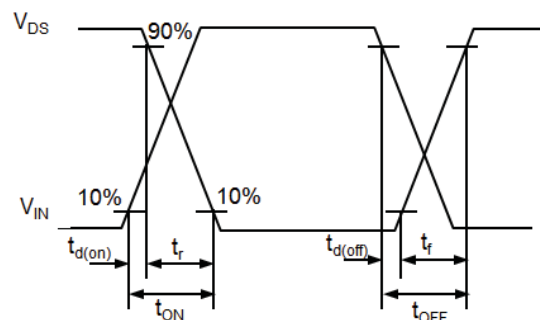
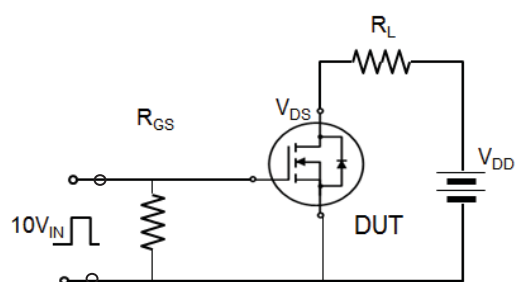
Gate Threshold Voltage



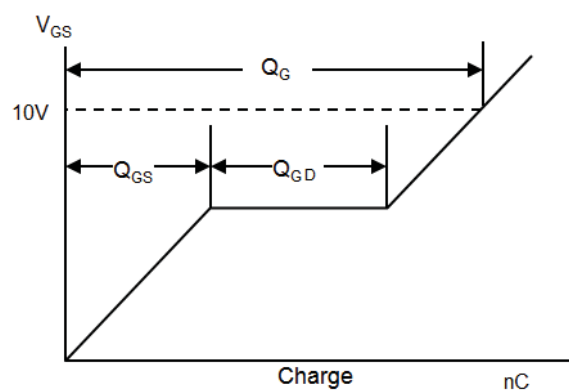
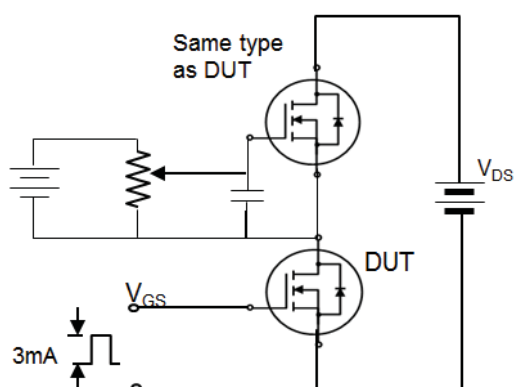
## Avalanche Test Circuit



## Switching Time Test Circuit

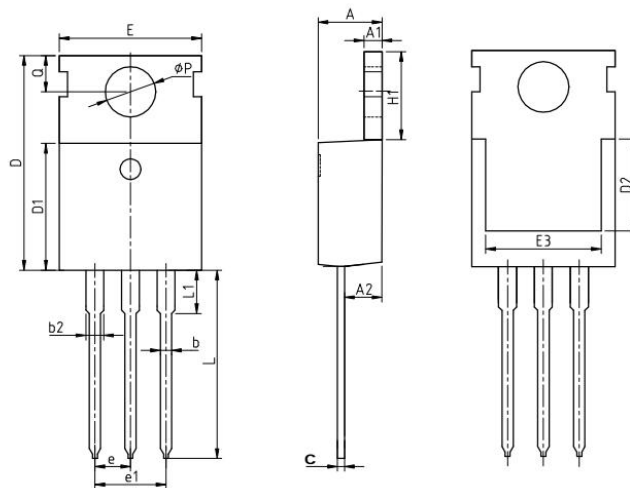


## Gate Charge Test Circuit



## Package Information

### TO-220AB

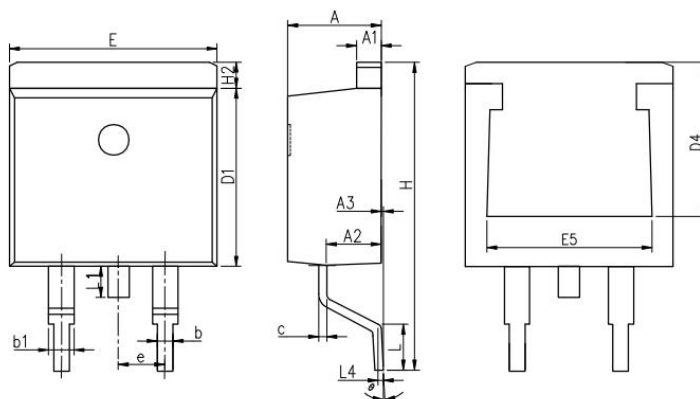


COMMON DIMENSIONS

| SYMBOL | mm       |       |       |
|--------|----------|-------|-------|
|        | MIN      | NOM   | MAX   |
| A      | 4.37     | 4.57  | 4.77  |
| A1     | 1.25     | 1.30  | 1.45  |
| A2     | 2.20     | 2.40  | 2.60  |
| b      | 0.70     | 0.80  | 0.95  |
| b2     | 1.17     | 1.27  | 1.47  |
| c      | 0.40     | 0.50  | 0.65  |
| D      | 15.10    | 15.60 | 16.10 |
| D1     | 8.80     | 9.10  | 9.40  |
| D2     | 5.50     | -     | -     |
| E      | 9.70     | 10.00 | 10.30 |
| E3     | 7.00     | -     | -     |
| e      | 2.54 BSC |       |       |
| e1     | 5.08 BSC |       |       |
| H1     | 6.25     | 6.50  | 6.85  |
| L      | 12.75    | 13.50 | 13.80 |
| L1     | -        | 3.10  | 3.40  |
| ΦP     | 3.40     | 3.60  | 3.80  |
| Q      | 2.60     | 2.80  | 3.00  |

## Package Information

### TO-263



COMMON DIMENSIONS

| SYMBOL | mm       |       |       |
|--------|----------|-------|-------|
|        | MIN      | NOM   | MAX   |
| A      | 4.37     | 4.57  | 4.77  |
| A1     | 1.22     | 1.27  | 1.42  |
| A2     | 2.49     | 2.69  | 2.89  |
| A3     | 0        | 0.13  | 0.25  |
| b      | 0.7      | 0.81  | 0.96  |
| b1     | 1.17     | 1.27  | 1.47  |
| c      | 0.3      | 0.38  | 0.53  |
| D1     | 8.5      | 8.7   | 8.9   |
| D4     | 6.6      | -     | -     |
| E      | 9.86     | 10.16 | 10.36 |
| E5     | 7.06     | -     | -     |
| e      | 2.54 BSC |       |       |
| H      | 14.7     | 15.1  | 15.5  |
| H2     | 1.07     | 1.27  | 1.47  |
| L      | 2        | 2.3   | 2.6   |
| L1     | 1.4      | 1.55  | 1.7   |
| L4     | 0.25 BSC |       |       |
| θ      | 0°       | 5°    | 9°    |