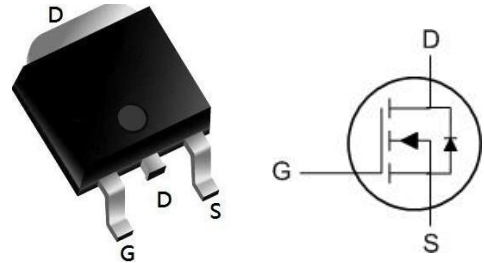


### Product Summary

| BVDS | RDSON | ID  |
|------|-------|-----|
| 30V  | 9.5mΩ | 30A |

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



TO252

### Absolute Maximum Ratings

| Symbol                 | Parameter                                  | Rating     |              | Units       |
|------------------------|--------------------------------------------|------------|--------------|-------------|
|                        |                                            | 10s        | Steady State |             |
| $V_{DS}$               | Drain-Source Voltage                       | 30         |              | V           |
| $V_{GS}$               | Gate-Source Voltage                        | $\pm 20$   |              | V           |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 30         |              | A           |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 16         |              | A           |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>          | 88         |              | A           |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup> | 18         |              | mJ          |
| $I_{AS}$               | Avalanche Current                          | 23.8       |              | A           |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>       | 11.5       |              | W           |
| $T_{STG}$              | Storage Temperature Range                  | -55 to 175 |              | $^{\circ}C$ |
| $T_J$                  | Operating Junction Temperature Range       | -55 to 175 |              | $^{\circ}C$ |

### Thermal Data

| Symbol          | Parameter                                     | Typ. | Max. | Unit          |
|-----------------|-----------------------------------------------|------|------|---------------|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup> | ---  | 9.26 | $^{\circ}C/W$ |

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

| Symbol                                                 | Parameter                                                 | Test Condition                                                                              | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                  | 30   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V,                                                  | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                  | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                             |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                    | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                                                   |      | 9.5  | 13   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                                                   | -    | 16   | 22.5 |       |
| Dynamic Characteristics                                |                                                           |                                                                                             |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                      | -    | 551  | -    | pF    |
| C <sub>oss</sub>                                       | Output Capacitance                                        |                                                                                             | -    | 108  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |                                                                                             | -    | 93   | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =15V, I <sub>D</sub> =10A,<br>V <sub>GS</sub> =10V                          | -    | 15   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                             | -    | 4.7  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                             | -    | 3.6  | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                             |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =30V,<br>I <sub>D</sub> =20A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =10V | -    | 5    | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                             | -    | 8    | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                             | -    | 21   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                             | -    | 7    | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                             |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                             | -    | -    | 30   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                             | -    | -    | 80   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                                    | -    | -    | 1.2  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =20A,di/dt=100A/μs                                                           | -    | 7    | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                        |                                                                                             | -    | 5.9  | -    | nC    |

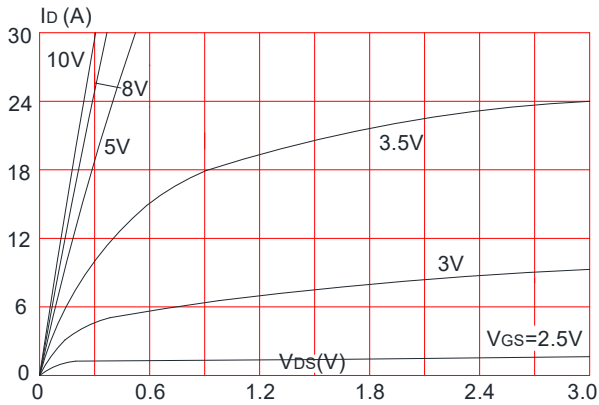
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=15V$ ,  $V_G=10V$ ,  $R_G=25\Omega$ ,  $L=0.5mH$ ,  $I_{AS}=8A$

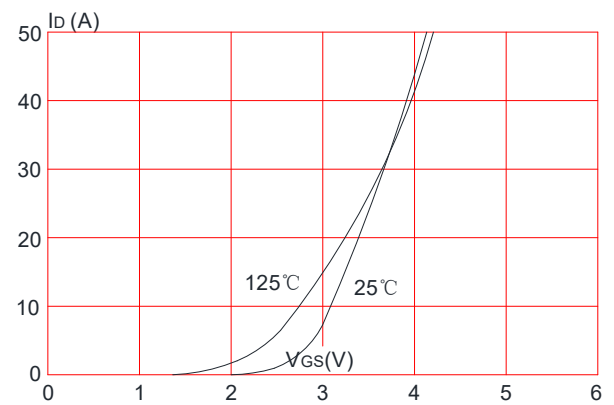
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

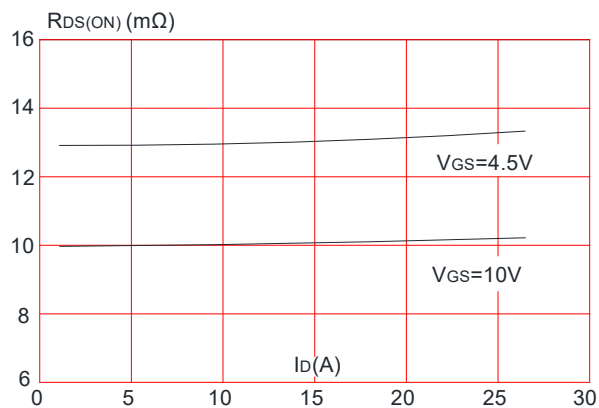
**Figure 1:** Output Characteristics



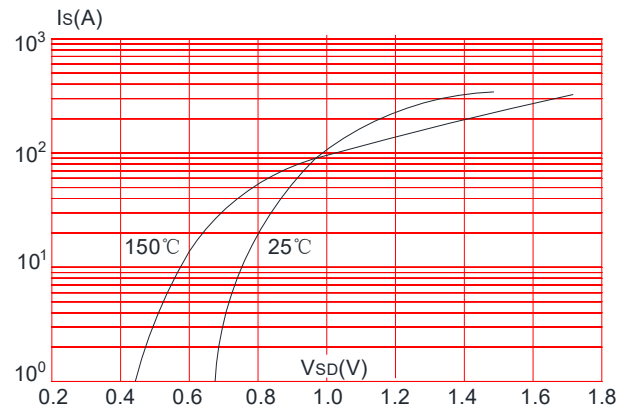
**Figure 2:** Typical Transfer Characteristics



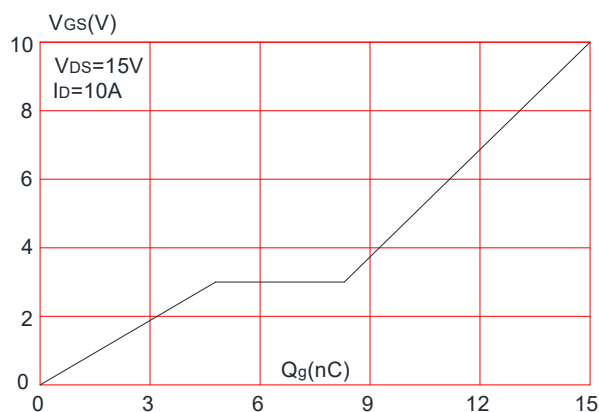
**Figure 3:** On-resistance vs. Drain Current



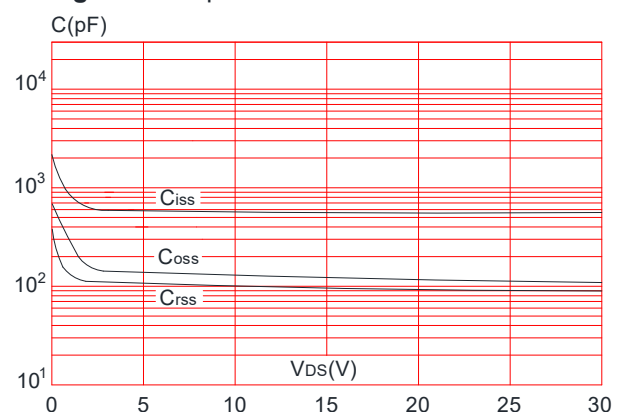
**Figure 4:** Body Diode Characteristics



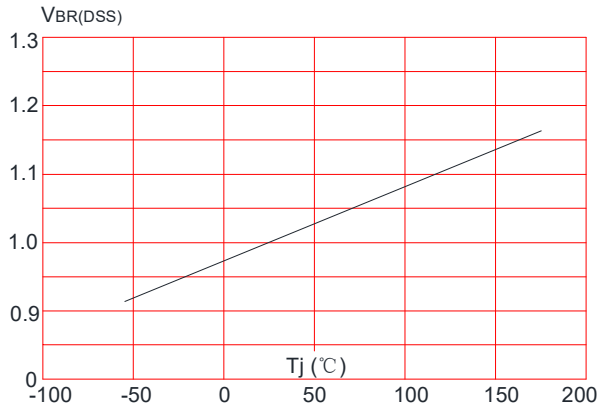
**Figure 5:** Gate Charge Characteristics



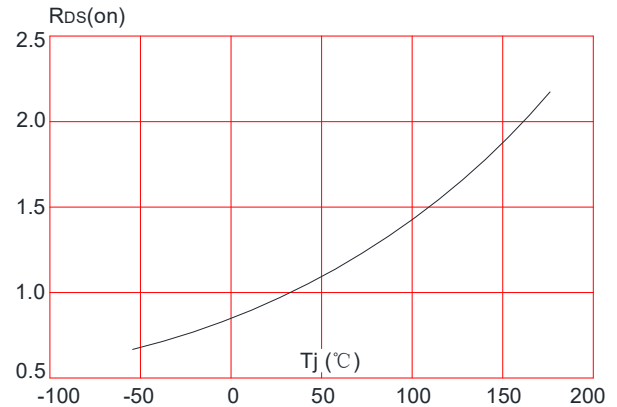
**Figure 6:** Capacitance Characteristics



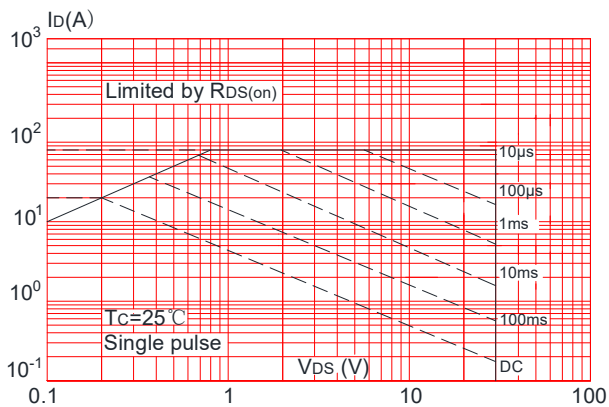
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



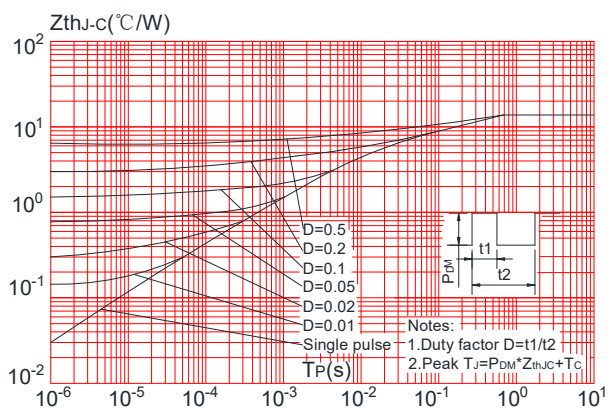
**Figure 8:** Normalized on Resistance vs. Junction Temperature



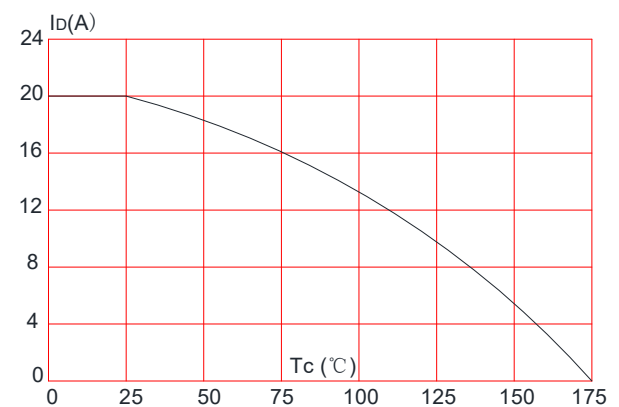
**Figure 9:** Maximum Safe Operating Area



Maximum Effective Transient Thermal Impedance, Junction-to-Case



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



## Test Circuit

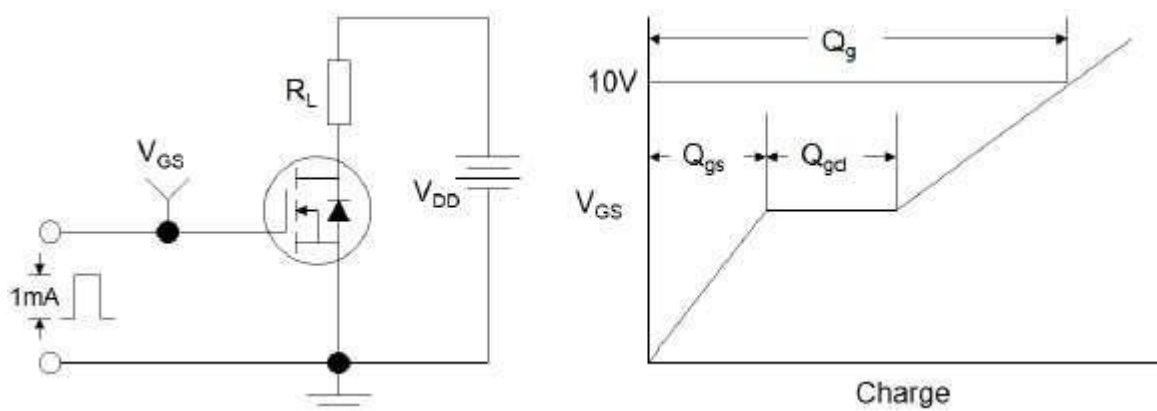


Figure1:Gate Charge Test Circuit & Waveform

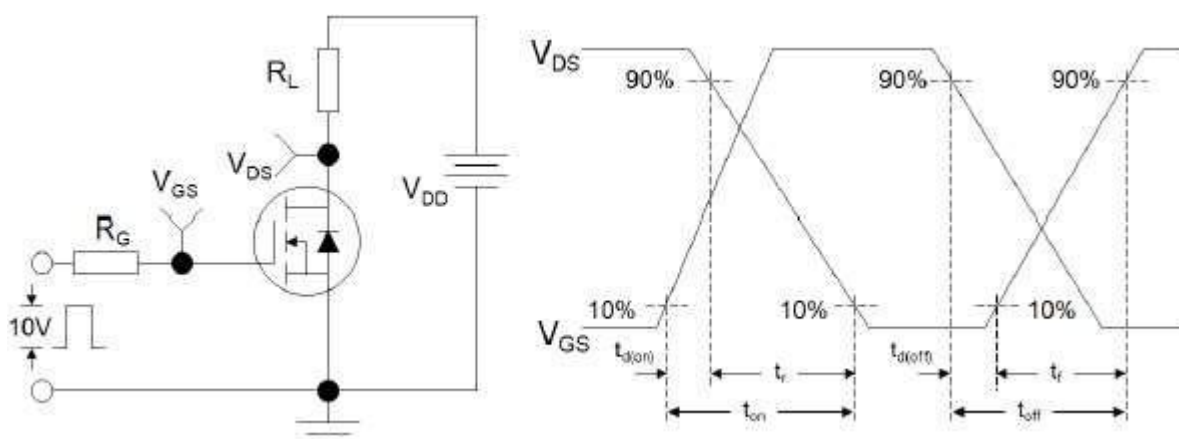


Figure 2: Resistive Switching Test Circuit & Waveforms

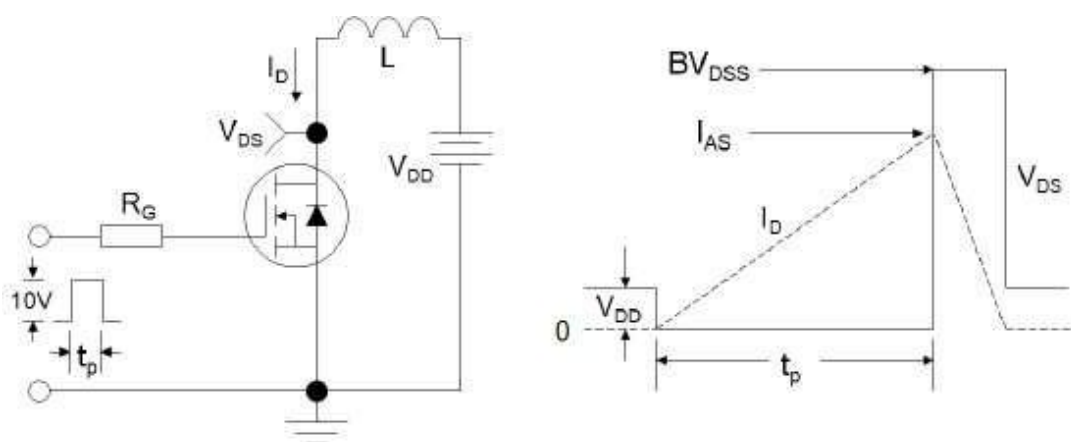
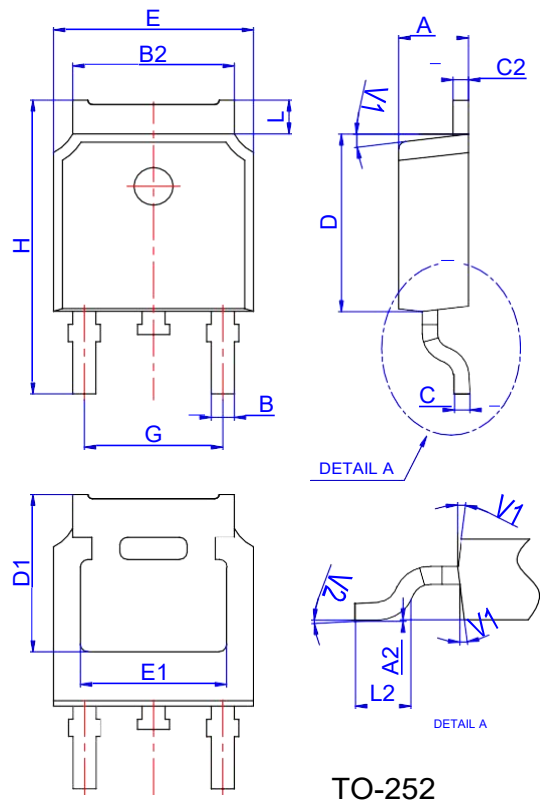


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data TO 252 4R



| Ref. | Dimensions  |      |       |          |      |       |
|------|-------------|------|-------|----------|------|-------|
|      | Millimeters |      |       | Inches   |      |       |
|      | Min.        | Typ. | Max.  | Min.     | Typ. | Max.  |
| A    | 2.10        |      | 2.50  | 0.083    |      | 0.098 |
| A2   | 0           |      | 0.10  | 0        |      | 0.004 |
| B    | 0.66        |      | 0.86  | 0.026    |      | 0.034 |
| B2   | 5.18        |      | 5.48  | 0.202    |      | 0.216 |
| C    | 0.40        |      | 0.60  | 0.016    |      | 0.024 |
| C2   | 0.44        |      | 0.58  | 0.017    |      | 0.023 |
| D    | 5.90        |      | 6.30  | 0.232    |      | 0.248 |
| D1   | 5.30REF     |      |       | 0.209REF |      |       |
| E    | 6.40        |      | 6.80  | 0.252    |      | 0.268 |
| E1   | 4.63        |      |       | 0.182    |      |       |
| G    | 4.47        |      | 4.67  | 0.176    |      | 0.184 |
| H    | 9.50        |      | 10.70 | 0.374    |      | 0.421 |
| L    | 1.09        |      | 1.21  | 0.043    |      | 0.048 |
| L2   | 1.35        |      | 1.65  | 0.053    |      | 0.065 |
| V1   |             | 7°   |       |          | 7°   |       |
| V2   | 0°          |      | 6°    | 0°       |      | 6°    |

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