

### Description

The MS320N10TLG2 uses advanced **SGT<sub>1.1</sub>** technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 100V$   $I_D = 320A$

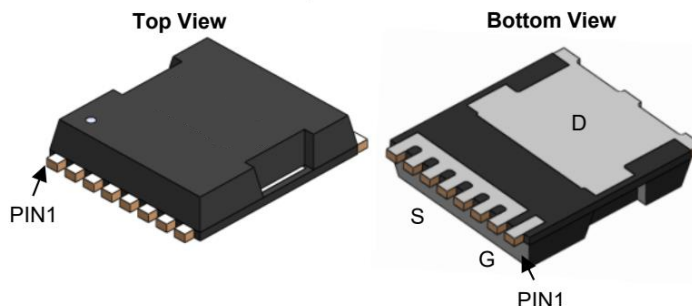
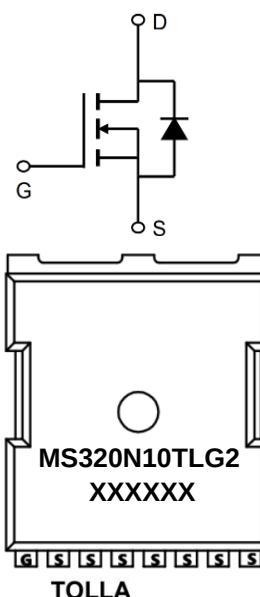
$R_{DS(ON)} < 1.6m\Omega$  @  $V_{GS}=10V$  (Type: **1.3mΩ**)

### Application

DC/DC Converter

LED Backlighting

Power Management Switches



### Package Marking and Ordering Information

| Product ID   | Package  | Marking             | Qty(PCS) |
|--------------|----------|---------------------|----------|
| MS320N10TLG2 | TOLLA-8L | MS320N10TLG2 XXXXXX | 2000     |

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise noted)

| Symbol                      | Parameter                                | Rating     | Units              |
|-----------------------------|------------------------------------------|------------|--------------------|
| $V_{DS}$                    | Drain-Source Voltage                     | 100        | V                  |
| $V_{GS}$                    | Gate-Source Voltage                      | $\pm 20$   | V                  |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS}$ @ 10V | 320        | A                  |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ 10V | 210        | A                  |
| IDM                         | Pulsed Drain Current                     | 1248       | A                  |
| EAS                         | Single Pulse Avalanche Energy            | 2340       | mJ                 |
| IAS                         | Avalanche Current                        | 53.4       | A                  |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>     | 390.6      | W                  |
| TSTG                        | Storage Temperature Range                | -55 to 175 | $^\circ\text{C}$   |
| $T_J$                       | Operating Junction Temperature Range     | -55 to 175 | $^\circ\text{C}$   |
| $R_{\theta JA}$             | Thermal Resistance Junction-Ambient      | 40         | $^\circ\text{C/W}$ |
| $R_{\theta JC}$             | Thermal Resistance Junction-Case         | 0.32       | $^\circ\text{C/W}$ |

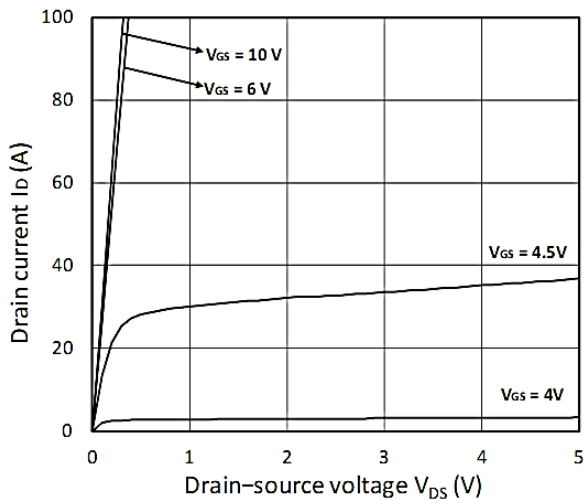
## Electrical Characteristics (T<sub>C</sub>=25°C unless otherwise noted)

| Symbol          | Parameter                                             | Test Conditions                                                                            | Min. | Typ.  | Max. | Unit |
|-----------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------|------|-------|------|------|
| V(BR)DSS        | Drain-Source Breakdown Voltage                        | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               | 100  | 111   | -    | V    |
| IGSS            | Gate-body Leakage current                             | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                               | -    | -     | ±100 | nA   |
| IDSS            | Zero Gate Voltage Drain Current T <sub>J</sub> =25°C  | V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V                                               | -    | -     | 1    | μA   |
| IDSS            | Zero Gate Voltage Drain Current T <sub>J</sub> =100°C |                                                                                            | -    | -     | 100  |      |
| VGS(th)         | Gate-Threshold Voltage                                | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 | 2.0  | 3.0   | 4.0  | V    |
| RDS(on)         | Drain-Source on-Resistance <sup>4</sup>               | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                | -    | 1.3   | 1.6  | mΩ   |
| gfs             | Forward Transconductance <sup>4</sup>                 | V <sub>DS</sub> = 10V, I <sub>D</sub> = 20A                                                | -    | 84    | -    | S    |
| Ciss            | Input Capacitance                                     | V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                   | -    | 14300 | -    | pF   |
| Coss            | Output Capacitance                                    |                                                                                            | -    | 2120  | -    |      |
| Crss            | Reverse Transfer Capacitance                          |                                                                                            | -    | 50    | -    |      |
| R <sub>g</sub>  | Gate Resistance                                       | f=1MHz                                                                                     | -    | 2.8   | -    | Ω    |
| Q <sub>g</sub>  | Total Gate Charge                                     | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 50V,<br>I <sub>D</sub> = 20A                      | -    | 250   | -    | nC   |
| Q <sub>gs</sub> | Gate-Source Charge                                    |                                                                                            | -    | 53    | -    |      |
| Q <sub>gd</sub> | Gate-Drain Charge                                     |                                                                                            | -    | 77    | -    |      |
| td(on)          | Turn-on Delay Time                                    | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 50V,<br>R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A | -    | 41    | -    | ns   |
| t <sub>r</sub>  | Rise Time                                             |                                                                                            | -    | 88    | -    |      |
| td(off)         | Turn-off Delay Time                                   |                                                                                            | -    | 163   | -    |      |
| t <sub>f</sub>  | Fall Time                                             |                                                                                            | -    | 98    | -    |      |
| trr             | Body Diode Reverse Recovery Time                      | I <sub>F</sub> = 20A, di/dt = 100A/μs                                                      | -    | 106   | -    | ns   |
| Q <sub>rr</sub> | Body Diode Reverse Recovery Charge                    |                                                                                            | -    | 245   | -    | nC   |
| VSD             | Diode Forward Voltage <sup>4</sup>                    | I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V                                                 | -    | -     | 1.2  | V    |
| I <sub>S</sub>  | Continuous Source Current T <sub>C</sub> =25°C        |                                                                                            | -    | -     | 312  | A    |

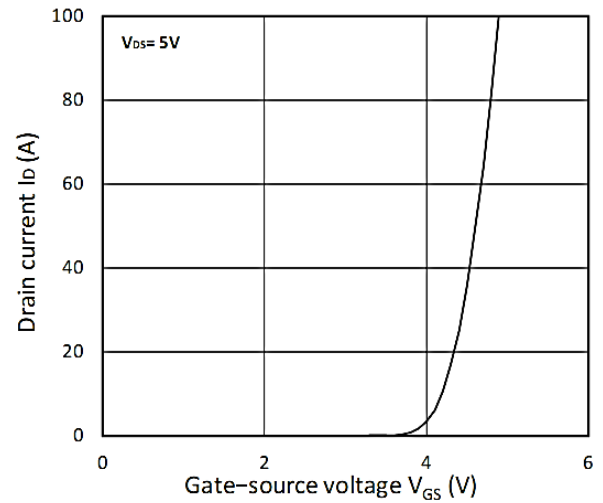
### Notes:

- 1、The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=90V, V<sub>GS</sub>=10V, L=1.0mH, I<sub>AS</sub>=50A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

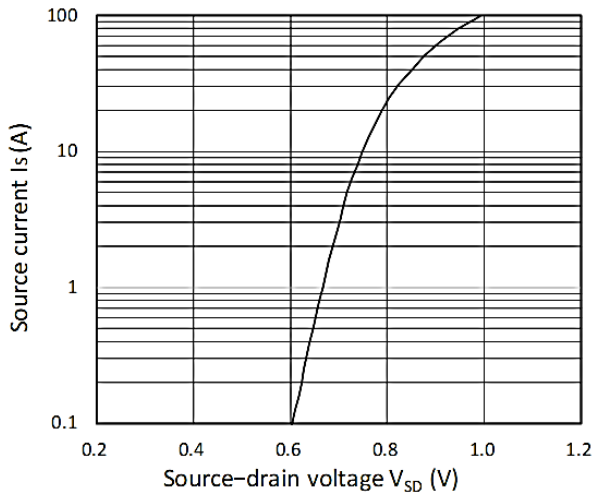
## Typical Characteristics



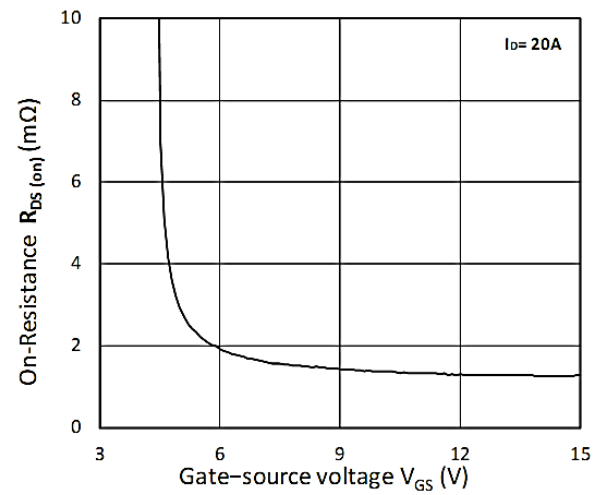
**Figure 1. Output Characteristics**



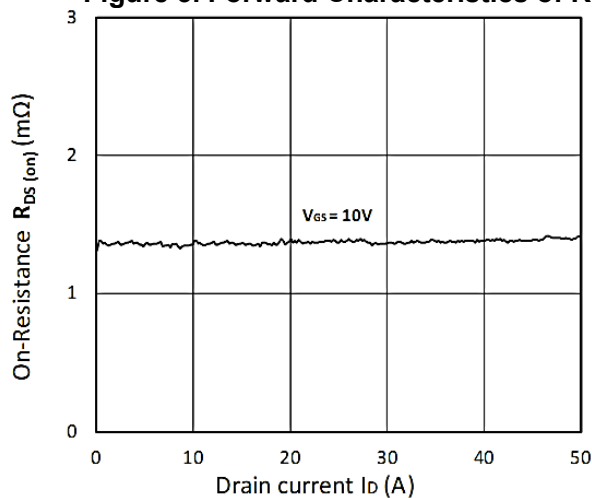
**Figure 2. Transfer Characteristics**



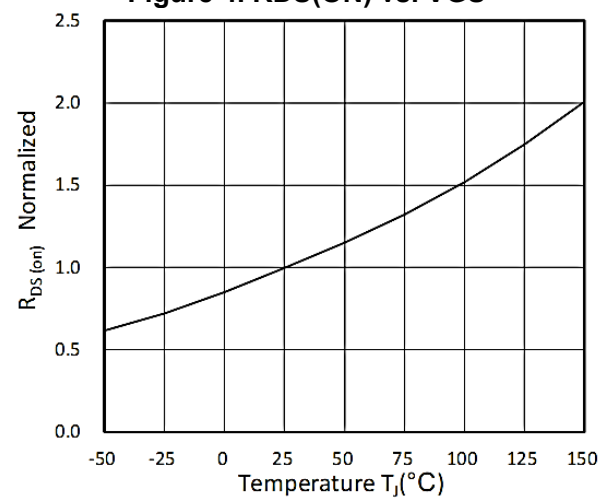
**Figure 3. Forward Characteristics of Reverse**



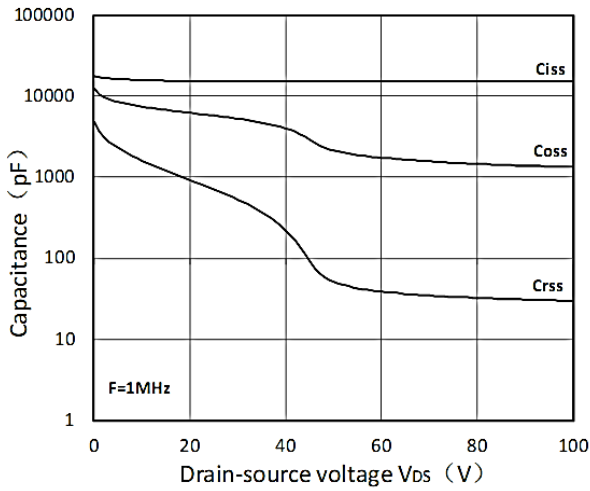
**Figure 4. R\_DS(ON) vs. V\_GS**



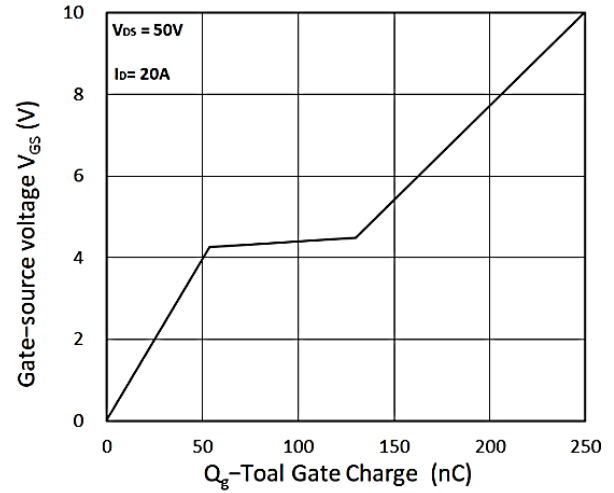
**Figure 5. R\_DS(ON) vs. I\_D**



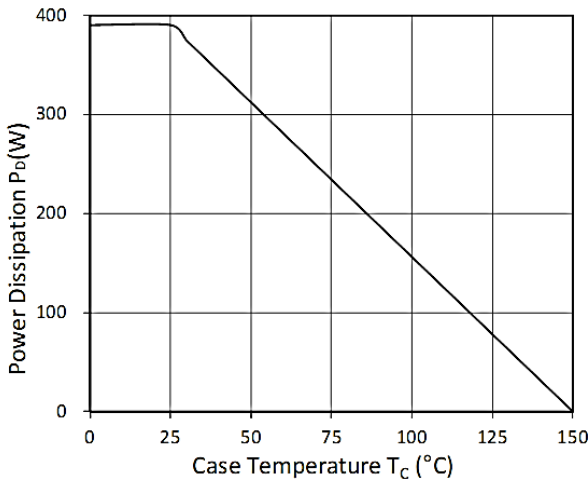
**Figure 6. Normalized R\_DS(on) vs. Temperature**



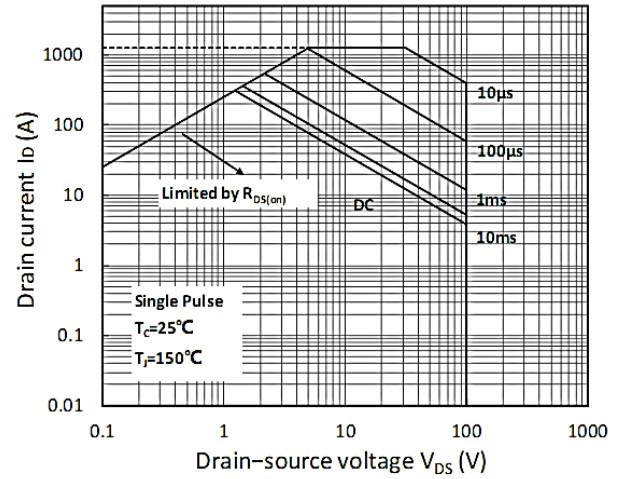
**Figure 7. Capacitance Characteristics**



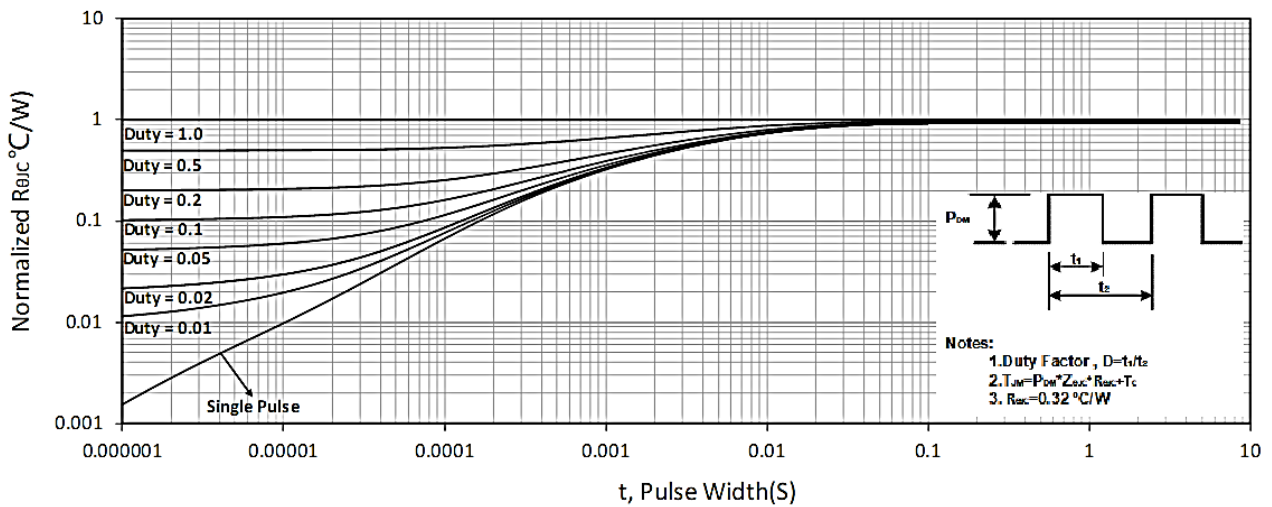
**Figure 8. Gate Charge Characteristics**



**Figure 9. Power Dissipation**

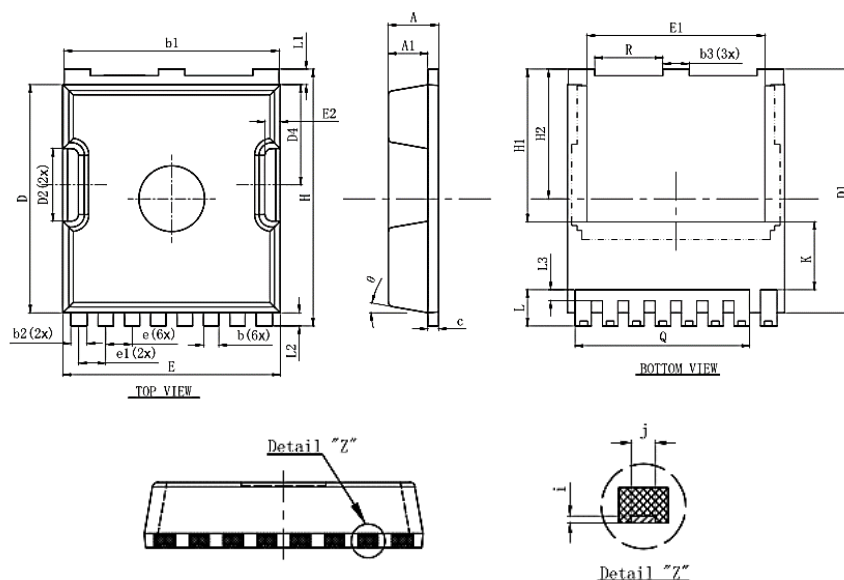


**Figure 10. Safe Operating Area**



**Figure 11. Normalized Maximum Transient Thermal Impedance**

## Package Mechanical Data TOLLA-8L



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom  | Max. |
| A      | 2.2                       | 2.3  | 2.4  |
| A1     | 1.7                       | 1.8  | 1.9  |
| b      | 0.6                       | 0.7  | 0.8  |
| b1     | 9.7                       | 9.8  | 9.9  |
| b2     | 0.65                      | 0.75 | 0.85 |
| b3     | 1.1                       | 1.2  | 1.3  |
| C      | 0.4                       | 0.5  | 0.6  |
| D      | 10.3                      | 10.4 | 10.5 |
| D1     | 11.0                      | 11.1 | 11.2 |
| D2     | 3.2                       | 3.3  | 3.4  |
| D4     | 4.47                      | 4.57 | 4.67 |
| E      | 9.8                       | 9.9  | 10.0 |
| E1     | 8.0                       | 8.1  | 8.2  |
| E2     | 0.5                       | 0.6  | 0.7  |
| e      | 1.200 (BSC)               |      |      |
| e1     | 1.225 (BSC)               |      |      |
| H      | 11.6                      | 11.7 | 11.8 |
| H1     | 6.95BSC                   |      |      |
| H2     | 5.9BSC                    |      |      |
| i      | 0.1REF                    |      |      |
| j      | 0.350REF                  |      |      |
| K      | 3.100REF                  |      |      |
| L      | 1.55                      | 1.65 | 1.75 |
| L1     | 0.6                       | 0.7  | 0.8  |
| L2     | 0.5                       | 0.6  | 0.7  |
| L3     | 0.4                       | 0.5  | 0.6  |
| Q      | 7.95REF                   |      |      |
| R      | 3.0                       | 3.1  | 3.2  |
| θ      | 10°REG                    |      |      |

| Edition | Date     | Change          |
|---------|----------|-----------------|
| REV1.0  | 2022/5/5 | Initial release |