



### Description

The SI7121ADN-T1-GE3 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is well suited for high current load applications.

### General Features

$V_{DS} = -30V, I_D = -40A$

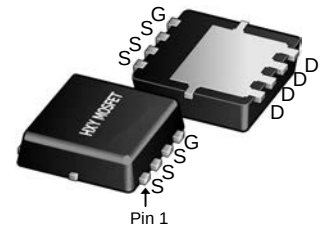
$R_{DS(ON)} < 15m\Omega @ V_{GS} = -10V$

$R_{DS(ON)} < 26m\Omega @ V_{GS} = -4.5V$

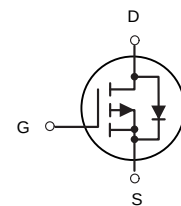
### Application

High side switch for full bridge converter

DC/DC converter for LCD display



DFN3X3-8L



P-Channel MOSFET

### Package Marking and Ordering Information

| Product ID       | Pack      | Brand      | Qty(PCS) |
|------------------|-----------|------------|----------|
| SI7121ADN-T1-GE3 | DFN3X3-8L | HXY MOSFET | 5000     |

### Absolute Maximum Ratings@ $T_J = 25^\circ C$ (unless otherwise specified)

| Symbol                   | Parameter                                                 | Rating     | Units        |
|--------------------------|-----------------------------------------------------------|------------|--------------|
| $V_{DS}$                 | Drain-Source Voltage                                      | -30        | V            |
| $V_{GS}$                 | Gate-Source Voltage                                       | +20        | V            |
| $I_D @ T_A = 25^\circ C$ | Drain Current <sup>3</sup> , $V_{GS} @ 10V$               | -40        | A            |
| $I_D @ T_A = 70^\circ C$ | Drain Current <sup>3</sup> , $V_{GS} @ 10V$               | -25        | A            |
| IDM                      | Pulsed Drain Current <sup>1</sup>                         | -120       | A            |
| $P_D @ T_A = 25^\circ C$ | Total Power Dissipation                                   | 15         | W            |
| TSTG                     | Storage Temperature Range                                 | -55 to 150 | $^\circ C$   |
| $T_J$                    | Operating Junction Temperature Range                      | -55 to 150 | $^\circ C$   |
| Rthj-c                   | Maximum Thermal Resistance, Junction-case                 | 6          | $^\circ C/W$ |
| Rthj-a                   | Maximum Thermal Resistance, Junction-ambient <sup>3</sup> | 66         | $^\circ C/W$ |



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

| Symbol               | Parameter                                                | Test Condition                                                                                  | Min. | Typ. | Max. | Units |
|----------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------|------|------|------|-------|
| 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   | μA    |
| I <sub>GSS</sub>     | Gate to Body Leakage Current                             | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                     | -    | -    | ±100 | nA    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                                   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = -250μA                                      | -1.0 | -1.6 | -2.5 | V     |
| R <sub>DS(on)</sub>  | Static Drain-Source on-Resistance<br>Note3               | V <sub>GS</sub> = -10V, I <sub>D</sub> = -10A                                                   | -    | 12   | 15   | mΩ    |
|                      |                                                          | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -5A                                                   | -    | 18   | 26   |       |
| C <sub>iss</sub>     | Input Capacitance                                        | V <sub>DS</sub> = -15V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                        | -    | 1330 | -    | pF    |
| C <sub>oss</sub>     | Output Capacitance                                       |                                                                                                 | -    | 183  | -    | pF    |
| C <sub>rss</sub>     | Reverse Transfer Capacitance                             |                                                                                                 | -    | 156  | -    | pF    |
| Q <sub>g</sub>       | Total Gate Charge                                        | V <sub>DS</sub> = -15V, I <sub>D</sub> = -5A,<br>V <sub>GS</sub> = -10V                         | -    | 22   | -    | nC    |
| Q <sub>gs</sub>      | Gate-Source Charge                                       |                                                                                                 | -    | 1.0  | -    | nC    |
| Q <sub>gd</sub>      | Gate-Drain("Miller") Charge                              |                                                                                                 | -    | 1.8  | -    | nC    |
| t <sub>d(on)</sub>   | Turn-on Delay Time                                       | V <sub>DD</sub> = -15V, I <sub>D</sub> = -10A,<br>V <sub>GS</sub> =-10V, R <sub>GEN</sub> =2.5Ω | -    | 9    | -    | ns    |
| t <sub>r</sub>       | Turn-on Rise Time                                        |                                                                                                 | -    | 13   | -    | ns    |
| t <sub>d(off)</sub>  | Turn-off Delay Time                                      |                                                                                                 | -    | 48   | -    | ns    |
| t <sub>f</sub>       | Turn-off Fall Time                                       |                                                                                                 | -    | 20   | -    | ns    |
| I <sub>S</sub>       | Maximum Continuous Drain to Source Diode Forward Current |                                                                                                 | -    | -    | -40  | A     |
| I <sub>SM</sub>      | Maximum Pulsed Drain to Source Diode Forward Current     |                                                                                                 | -    | -    | -90  | A     |
| V <sub>SD</sub>      | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> =0V, I <sub>S</sub> = -15A                                                      | -    | -0.8 | -1.2 | V     |
| t <sub>rr</sub>      | Reverse Recovery Time                                    | T <sub>J</sub> =25°C,                                                                           | -    | 64   | -    | ns    |
| Q <sub>rr</sub>      | Reverse Recovery Charge                                  | V <sub>DD</sub> = -24V, I <sub>F</sub> =-2.8A,<br>dI/dt=-100A/μs                                | -    | 25   | -    | nC    |

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

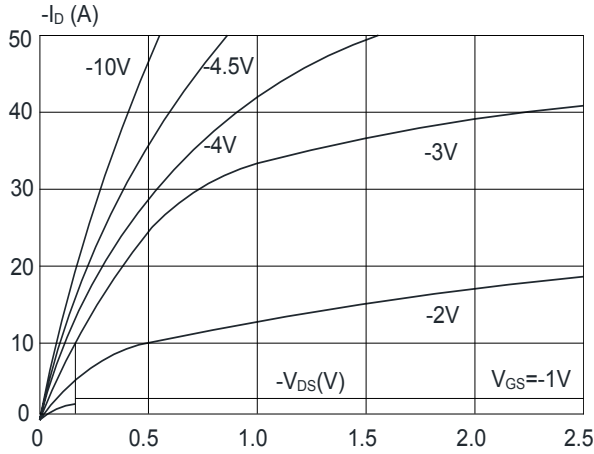
2. EAS condition: T<sub>J</sub>=25°C, V<sub>GS</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=-12.7A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

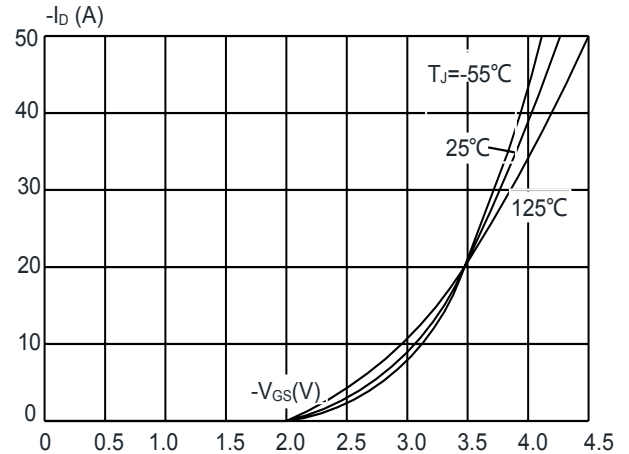


## Typical Performance Characteristics

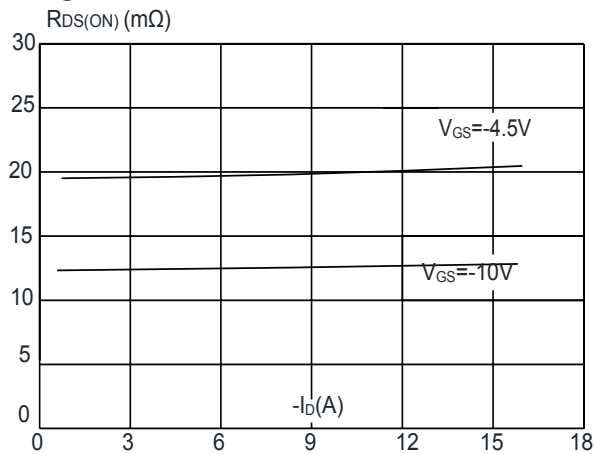
**Figure1: Output Characteristics**



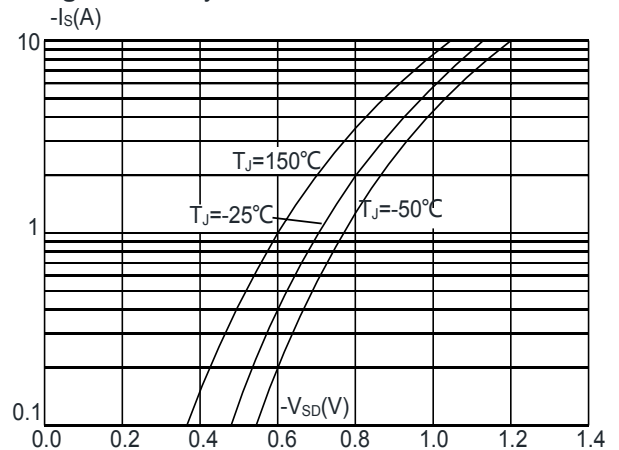
**Figure 2: Typical Transfer Characteristics**



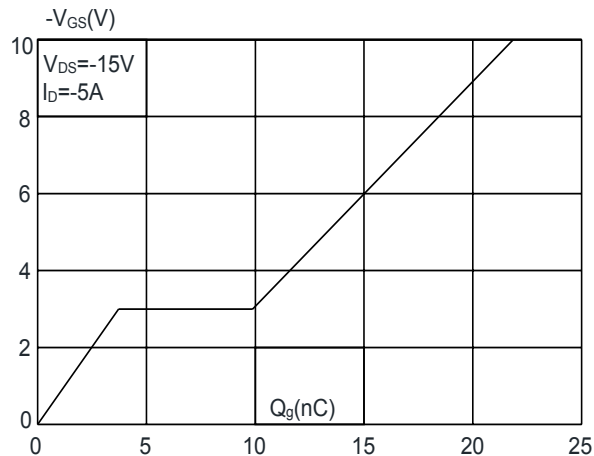
**Figure 3: On-resistance vs. Drain Current**



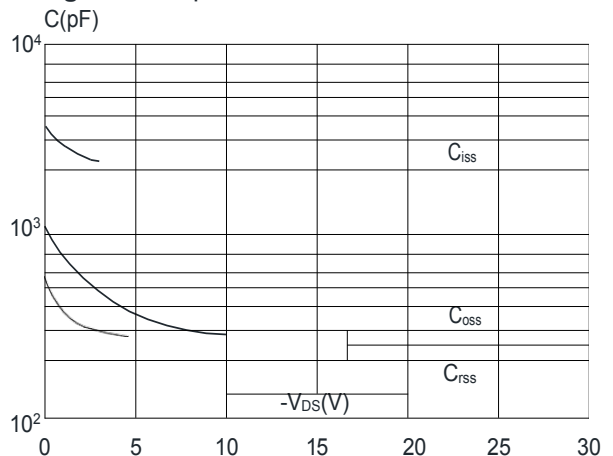
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**

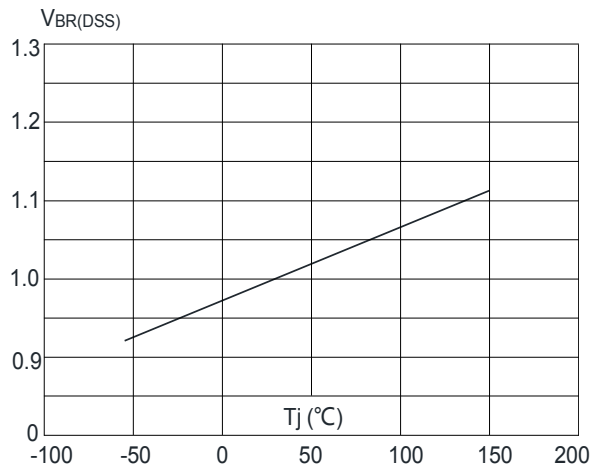


**Figure 6: Capacitance Characteristics**

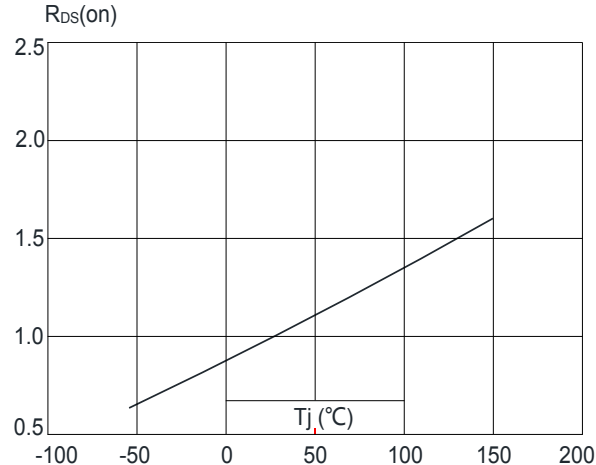




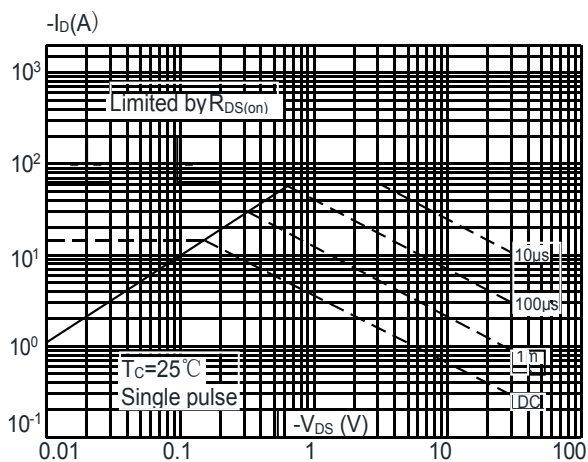
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



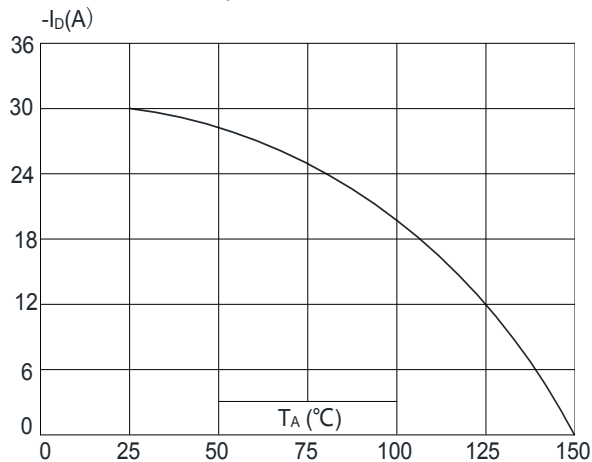
**Figure 8:** Normalized on Resistance vs. Junction Temperature



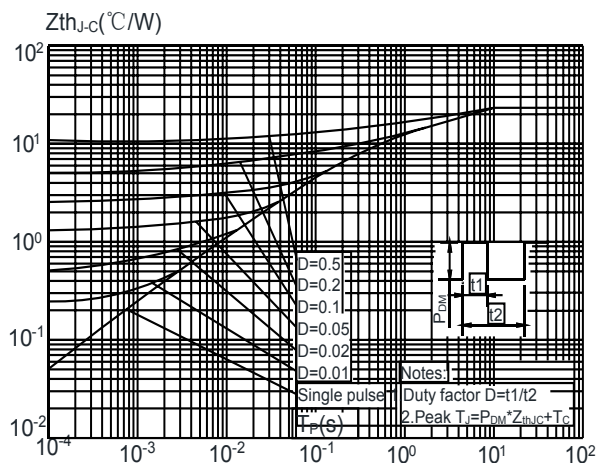
**Figure 9:** Maximum Safe Operating Area



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



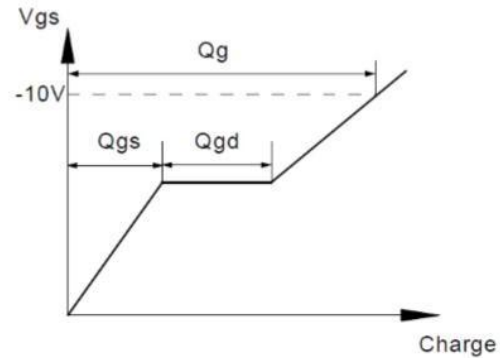
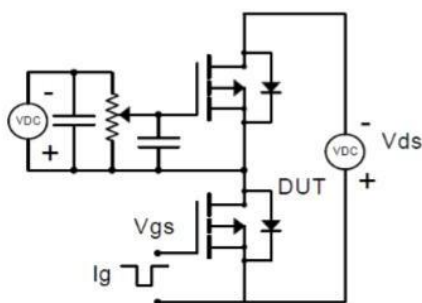
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



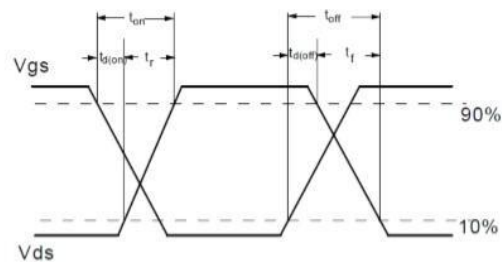
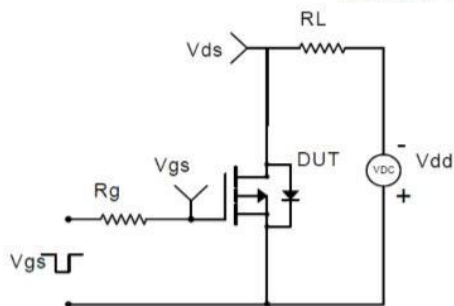


## Test Circuit

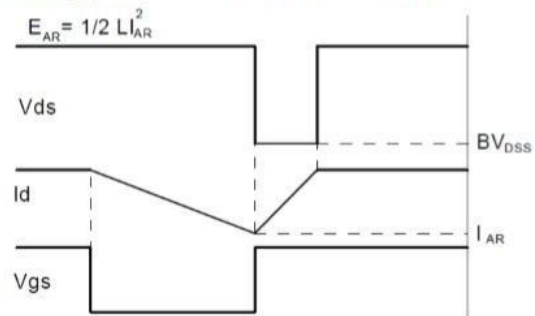
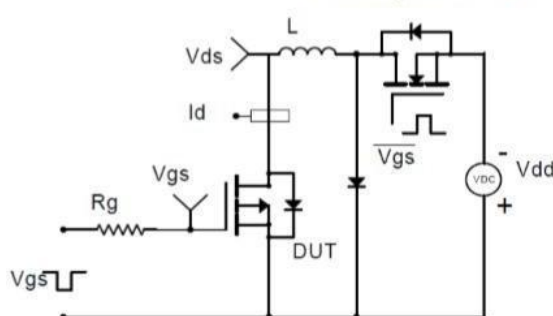
Gate Charge Test Circuit & Waveform



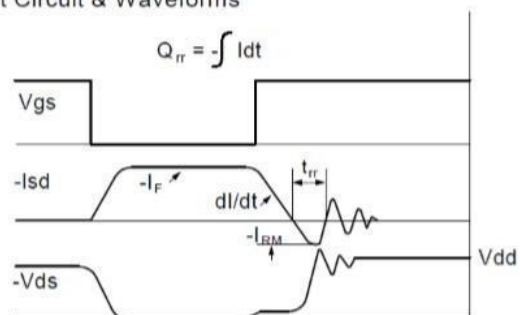
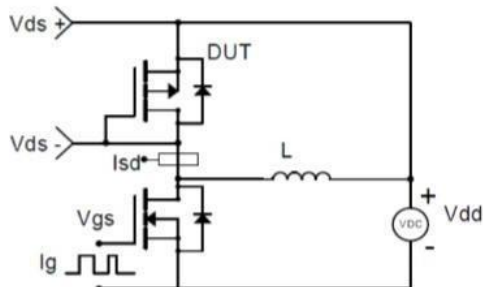
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

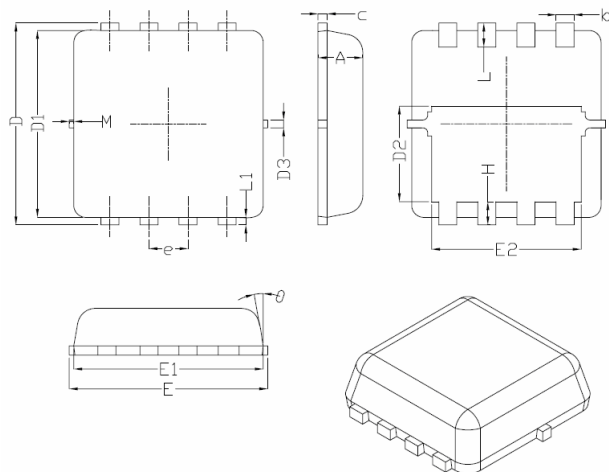


Diode Recovery Test Circuit & Waveforms





## DFN3X3-8L Package Information



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min.                      | Nom. | Max. |
| A      | 0.70                      | 0.75 | 0.80 |
| b      | 0.25                      | 0.30 | 0.35 |
| c      | 0.10                      | 0.15 | 0.25 |
| D      | 3.25                      | 3.35 | 3.45 |
| D1     | 3.00                      | 3.10 | 3.20 |
| D2     | 1.48                      | 1.58 | 1.68 |
| D3     | -                         | 0.13 | -    |
| E      | 3.20                      | 3.30 | 3.40 |
| E1     | 3.00                      | 3.15 | 3.20 |
| E2     | 2.39                      | 2.49 | 2.59 |
| e      | 0.65BSC                   |      |      |
| H      | 0.30                      | 0.39 | 0.50 |
| L      | 0.30                      | 0.40 | 0.50 |
| L1     | -                         | 0.13 | -    |
| M      | *                         | *    | 0.15 |
| θ      |                           | 10°  | 12°  |



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