

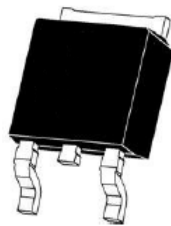


### Features

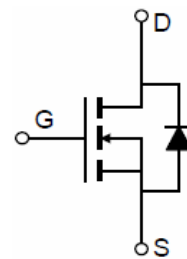
- Enhancement mode
- Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5\text{ V}$
- Fast Switching
- 100% Avalanche test
- Pb-free lead plating; RoHS compliant

### Product Summary

|                                      |     |            |
|--------------------------------------|-----|------------|
| $V_{DS}$                             | 30  | V          |
| $R_{DS(on),TYP}@ V_{GS}=10\text{ V}$ | 2.5 | m $\Omega$ |
| $I_D$                                | 120 | A          |



TO-252-2L top view



Schematic diagram

### Maximum ratings, at $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Symbol        | Parameter                                     |                           | Rating     | Unit             |
|---------------|-----------------------------------------------|---------------------------|------------|------------------|
| $V_{(BR)DSS}$ | Drain-Source breakdown voltage                |                           | 30         | V                |
| $I_S$         | Diode continuous forward current              | $T_C = 25^\circ\text{C}$  | 120        | A                |
| $I_D$         | Continuous drain current@ $V_{GS}=10\text{V}$ | $T_C = 25^\circ\text{C}$  | 120        | A                |
|               |                                               | $T_C = 100^\circ\text{C}$ | 80         | A                |
| $I_{DM}$      | Pulse drain current tested ①                  | $T_C = 25^\circ\text{C}$  | 480        | A                |
| EAS           | Avalanche energy, single pulsed ②             |                           | 100        | mJ               |
| $P_D$         | Maximum power dissipation                     | $T_C = 25^\circ\text{C}$  | 45         | W                |
| $V_{GS}$      | Gate-Source voltage                           |                           | $\pm 20$   | V                |
| $T_{STG} T_J$ | Storage and operating temperature range       |                           | -55 to 150 | $^\circ\text{C}$ |

### Thermal Characteristics

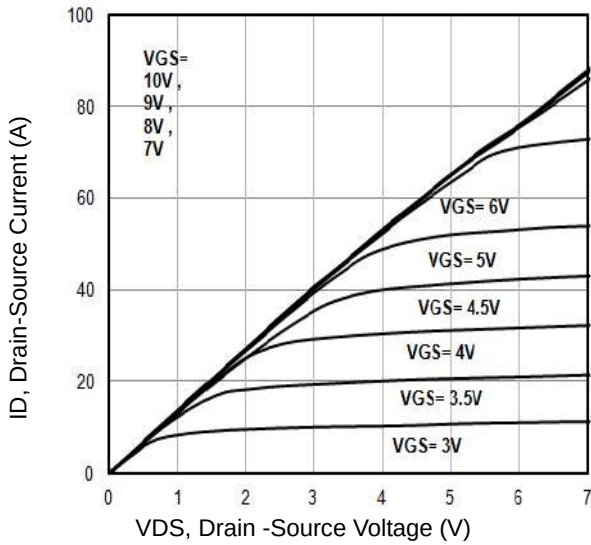
| Symbol          | Parameter                           | Typical | Unit               |
|-----------------|-------------------------------------|---------|--------------------|
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | 2.4     | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | 62      | $^\circ\text{C/W}$ |

| Symbol                                                                               | Parameter                                             | Condition                                                                                    | Min. | Typ. | Max. | Unit |
|--------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|------|------|
| Static Electrical Characteristics @ T <sub>j</sub> =25°C (unless otherwise stated)   |                                                       |                                                                                              |      |      |      |      |
| 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> =24V,V <sub>GS</sub> =0V                                                     | --   | --   | 1    | μA   |
|                                                                                      | Zero Gate Voltage Drain Current( T <sub>j</sub> =85°C | V <sub>DS</sub> =24V,V <sub>GS</sub> =0V                                                     | --   | --   | 30   | μA   |
| I <sub>GSS</sub>                                                                     | Gate-Body Leakage Current                             | V <sub>GS</sub> =±20V,V <sub>DS</sub> =0V                                                    | --   | --   | ±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  | 1.5  | 2.5  | V    |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance③                     | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                    | --   | 2.5  | 3.5  | mΩ   |
| R <sub>DS(ON)</sub>                                                                  | Drain-Source On-State Resistance③                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A                                                   | --   | 3.9  | 4.5  | mΩ   |
| Dynamic Electrical Characteristics @ T <sub>j</sub> = 25°C (unless otherwise stated) |                                                       |                                                                                              |      |      |      |      |
| C <sub>iss</sub>                                                                     | Input Capacitance                                     | V <sub>DS</sub> =15V,V <sub>GS</sub> =0V,<br>f=1MHz                                          | --   | 2921 | --   | pF   |
| C <sub>oss</sub>                                                                     | Output Capacitance                                    |                                                                                              | --   | 440  | --   | pF   |
| C <sub>rss</sub>                                                                     | Reverse Transfer Capacitance                          |                                                                                              | --   | 416  | --   | pF   |
| R <sub>g</sub>                                                                       | Gate Resistance                                       | f=1MHz                                                                                       | --   | 1.2  | --   | Ω    |
| Q <sub>g</sub>                                                                       | Total Gate Charge                                     | V <sub>DS</sub> =15V,I <sub>D</sub> =20A,<br>V <sub>GS</sub> =10V                            | --   | 63   | --   | nC   |
| Q <sub>gs</sub>                                                                      | Gate-Source Charge                                    |                                                                                              | --   | 13   | --   | nC   |
| Q <sub>gd</sub>                                                                      | Gate-Drain Charge                                     |                                                                                              | --   | 16   | --   | nC   |
| Switching Characteristics                                                            |                                                       |                                                                                              |      |      |      |      |
| t <sub>d(on)</sub>                                                                   | Turn-on Delay Time                                    | V <sub>DD</sub> =20V,<br>I <sub>D</sub> =20A,<br>R <sub>G</sub> =3Ω,<br>V <sub>GS</sub> =10V | --   | 14   | --   | nS   |
| t <sub>r</sub>                                                                       | Turn-on Rise Time                                     |                                                                                              | --   | 18   | --   | nS   |
| t <sub>d(off)</sub>                                                                  | Turn-Off Delay Time                                   |                                                                                              | --   | 99   | --   | nS   |
| t <sub>f</sub>                                                                       | Turn-Off Fall Time                                    |                                                                                              | --   | 45   | --   | nS   |
| Source- Drain Diode Characteristics@ T <sub>j</sub> = 25°C (unless otherwise stated) |                                                       |                                                                                              |      |      |      |      |
| V <sub>SD</sub>                                                                      | Forward on voltage                                    | I <sub>SD</sub> =20A,V <sub>GS</sub> =0V                                                     | --   | 0.79 | 1.2  | V    |
| t <sub>rr</sub>                                                                      | Reverse Recovery Time                                 | T <sub>j</sub> =25 °C,I <sub>sd</sub> =20A,<br>V <sub>GS</sub> =0V                           | --   | 32   | --   | nS   |
| Q <sub>rr</sub>                                                                      | Reverse Recovery Charge                               | di/dt=100A/μs                                                                                |      | 31   |      | nC   |

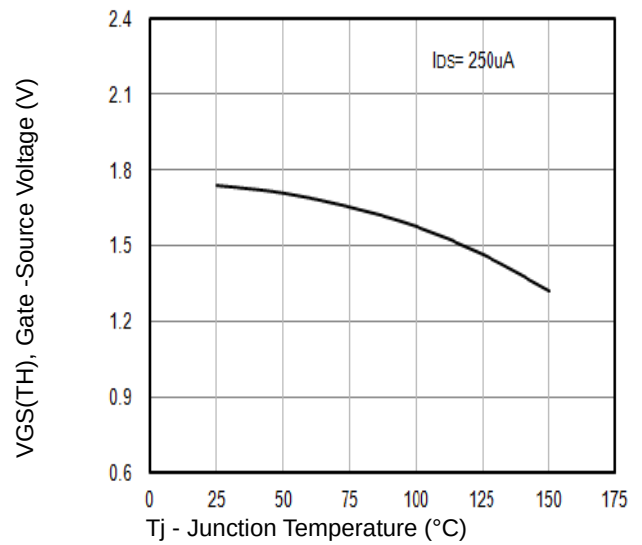
NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{jmax}$ , starting  $T_j = 25^{\circ}\text{C}$ ,  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 20A$ ,  $V_{GS} = 10V$ . Part not recommended for use above this value
- ③ Pulse width  $\leq 300\mu s$ ; duty cycles  $\leq 2\%$ .

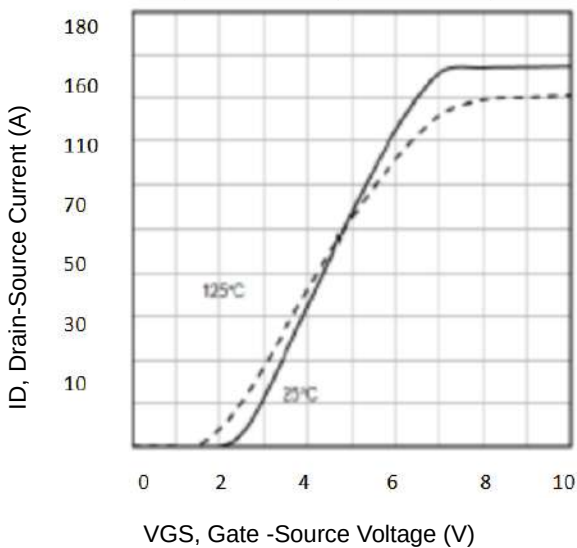
### Typical Characteristics



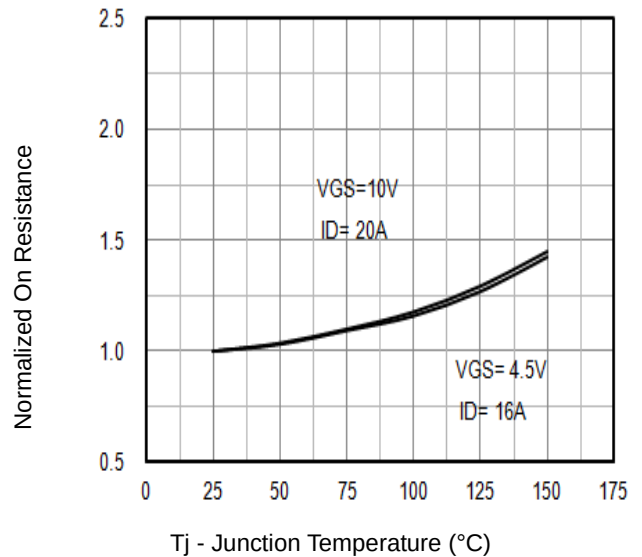
**Fig1.** Typical Output Characteristics



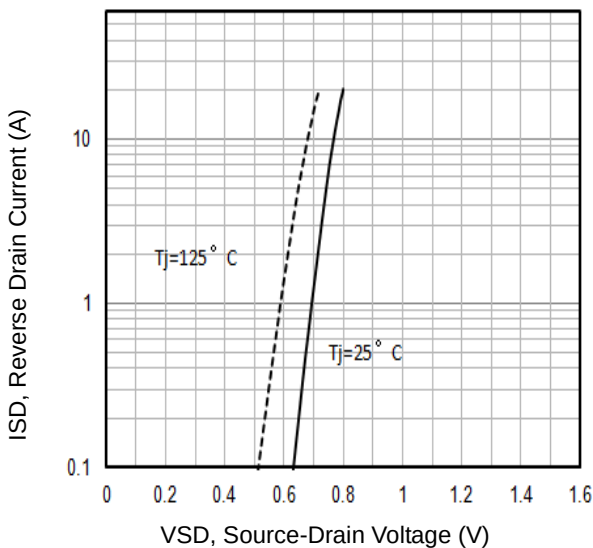
**Fig2.**  $V_{GS(TH)}$  Gate-Source Voltage (V)



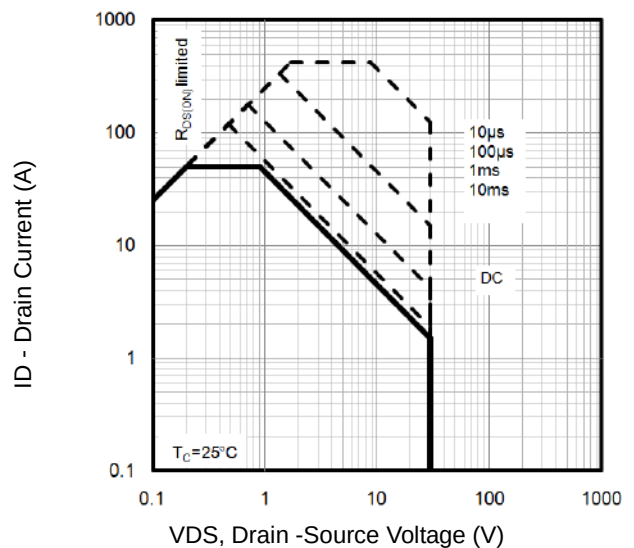
**Fig3.** Typical Transfer Characteristics



**Fig4.** Normalized On-Resistance Vs.  $T_j$

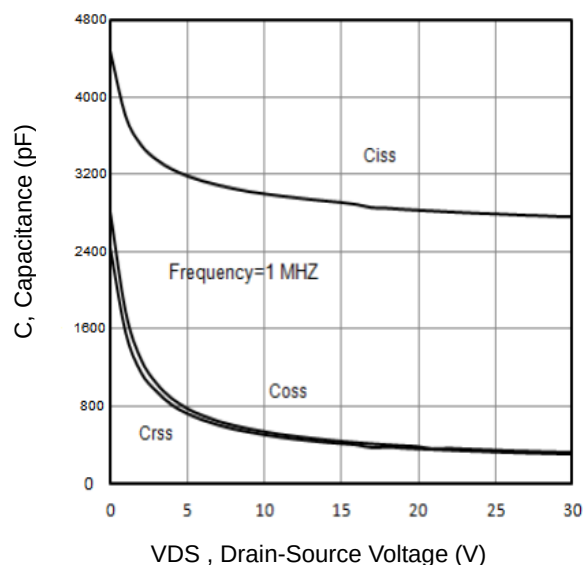


**Fig5.** Typical Source-Drain Diode Forward Voltage

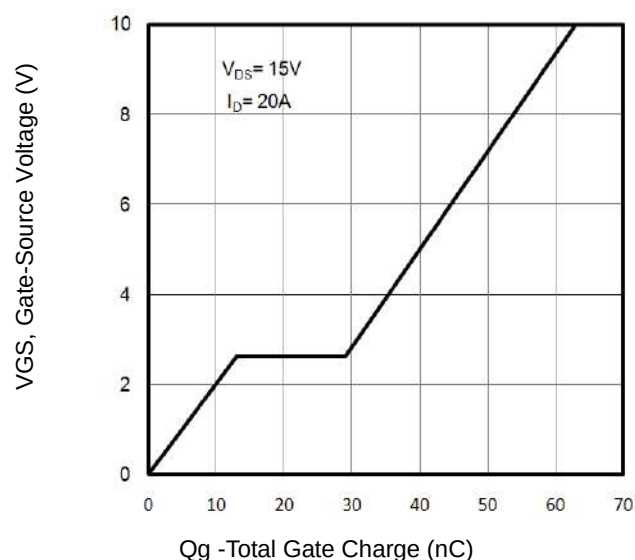


**Fig6.** Maximum Safe Operating Area

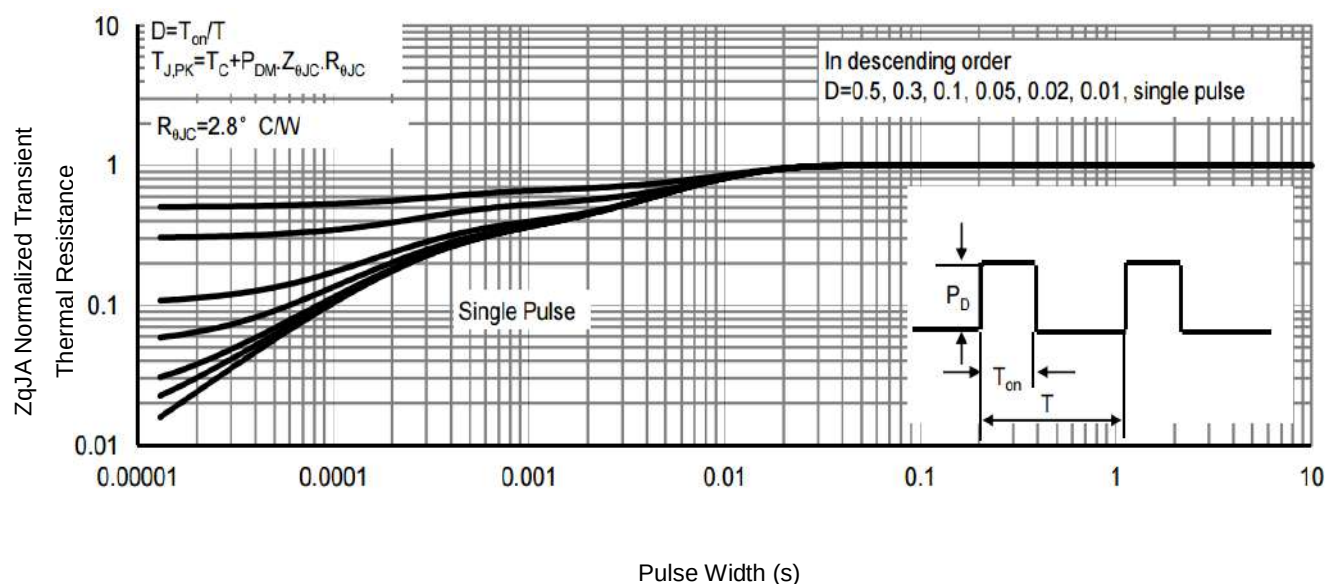
## Typical Characteristics



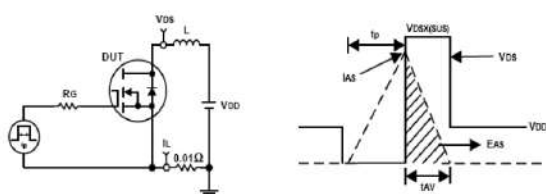
**Fig7.** Typical Capacitance Vs.Drain-Source Voltage



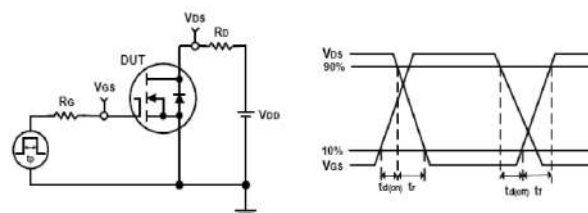
**Fig8.** Typical Gate Charge Vs.Gate-Source Voltage



**Fig9.** Normalized Maximum Transient Thermal Impedance



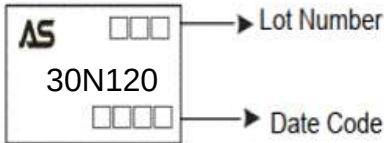
**Fig10.** Unclamped Inductive Test Circuit and waveforms



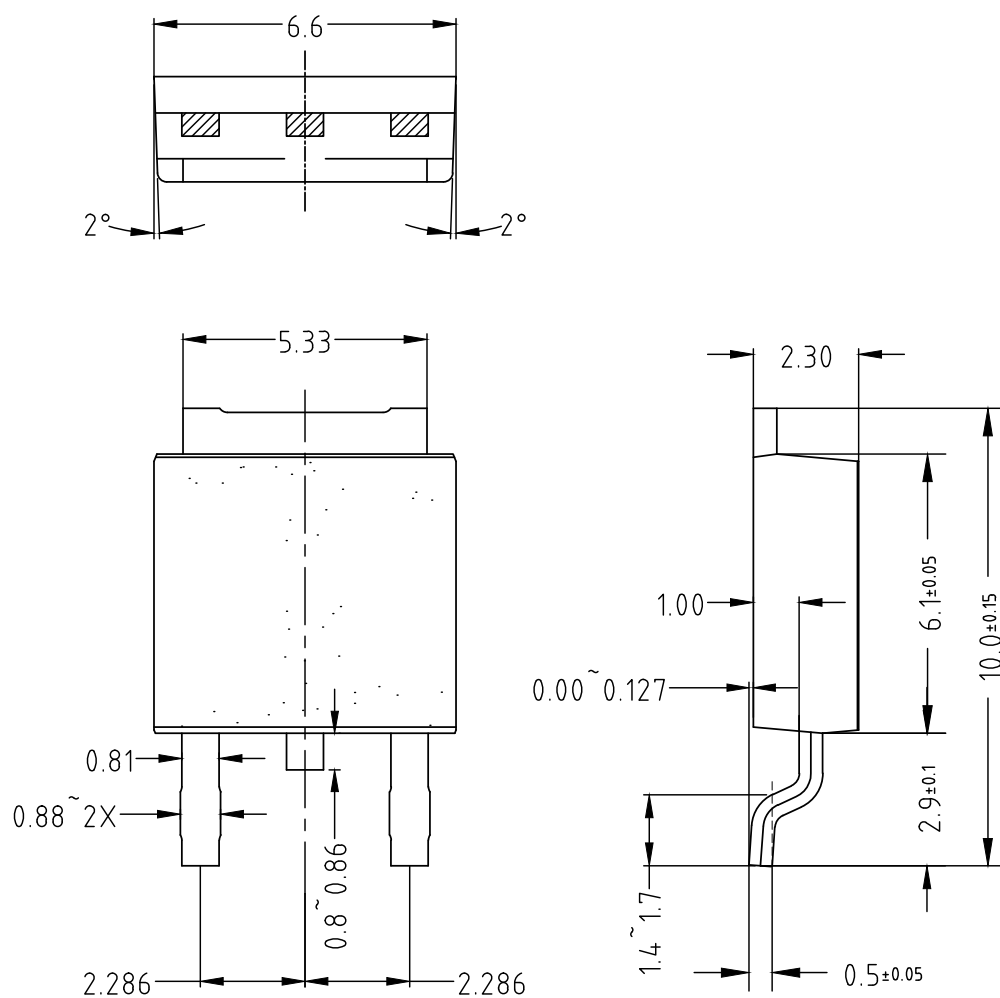
**Fig11.** Switching Time Test Circuit and waveforms

### Ordering and Marking Information

| Ordering Device No. | Marking | Package | Packing   | Quantity  |
|---------------------|---------|---------|-----------|-----------|
| ASDM30N120KQ-R      | 30N120  | TO-252  | Tape&Reel | 2500/Reel |

| PACKAGE | MARKING                                                                                                                                                                                                                                                                                                                                    |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TO-252  |  <p>The diagram shows a rectangular marking area on a TO-252 package. It contains the 'AS' logo, the part number '30N120', and two sets of four empty boxes. Arrows point from these boxes to the labels 'Lot Number' and 'Date Code' respectively.</p> |

# TO-252



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