

## 20V N-Channel Enhancement Mode MOSFET

### Description

The 30N02D uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 20V$   $I_D = 30A$

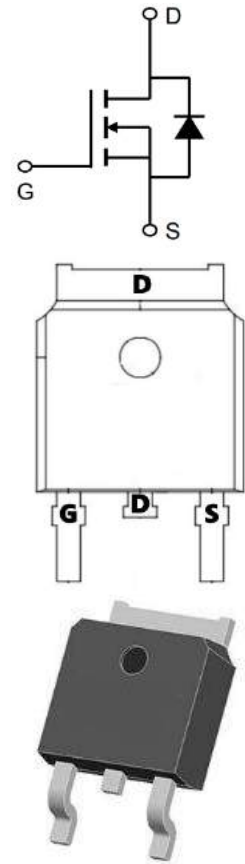
$R_{DS(ON)} = 11m\Omega @ V_{GS}=4.5V$

### Application

solar road lights

Load switch

Uninterruptible power supply



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

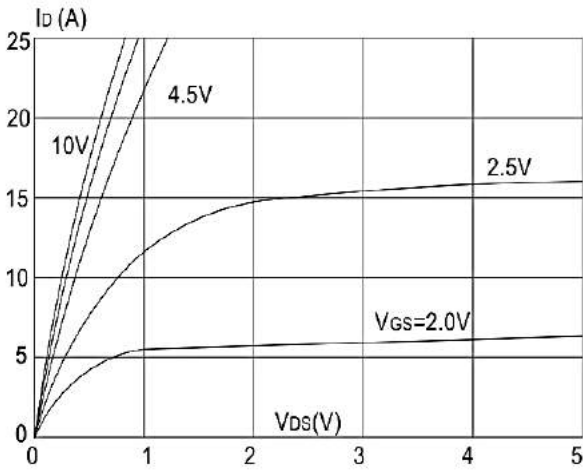
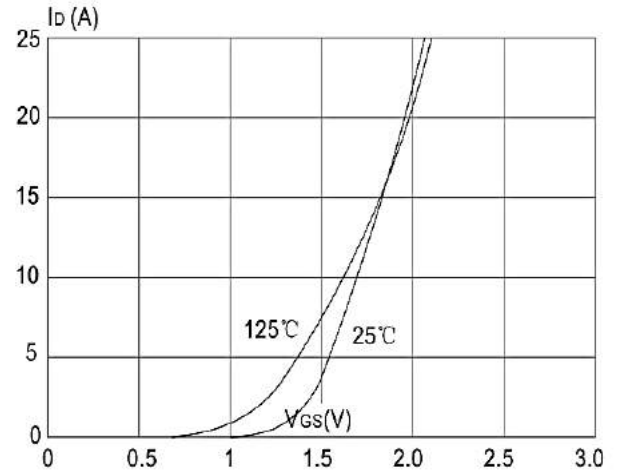
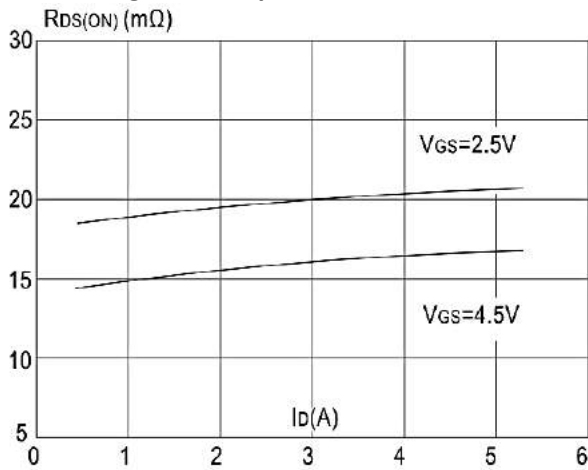
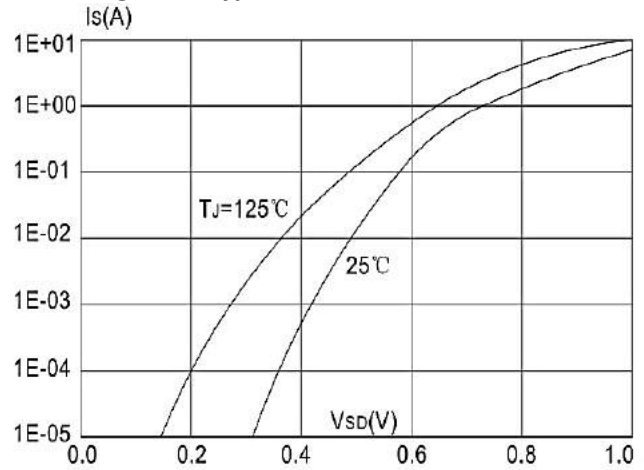
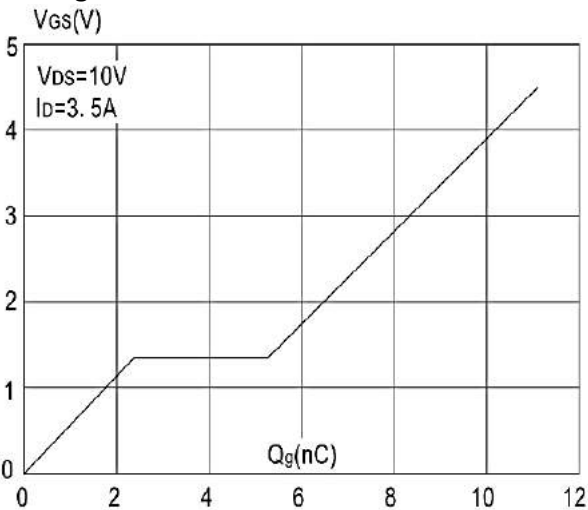
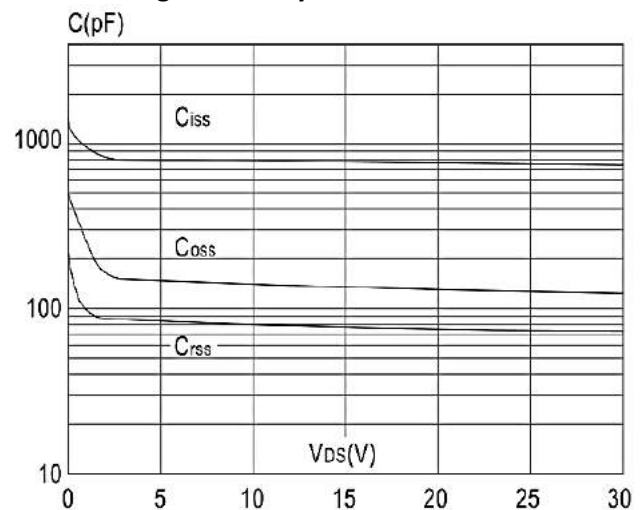
Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	30	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	13	A
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	6.3	A
$I_D @ T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	5.8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	50	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	8.1	mJ
$I_{AS}$	Avalanche Current	12.7	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	20.8	W
$P_D @ T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	2	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup>	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	6	$^\circ C/W$

**20V N-Channel Enhancement Mode MOSFET**
**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

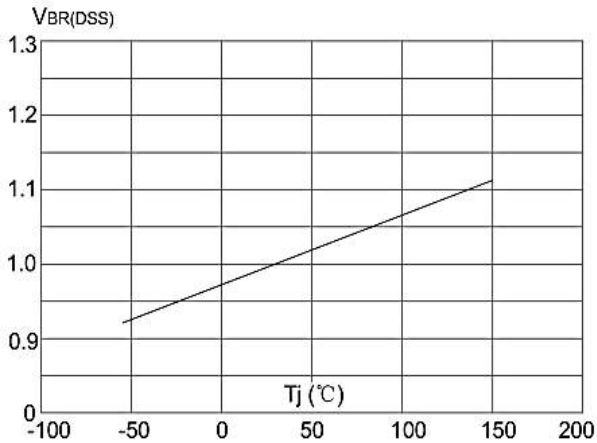
Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20	22		V
ΔBVDSS/ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.018	---	V/°C
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.50	0.65	1.0	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =7.6A		11	15	mΩ
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =2.5V, I <sub>D</sub> =3.5A		15.5	20	
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =1.8V, I <sub>D</sub> =2.5A		20.5	35	
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V			±100	nA
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHZ		888		pF
C <sub>oss</sub>	Output Capacitance			133		
C <sub>rss</sub>	Reverse Transfer Capacitance			117		
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A		11.05		nC
Q <sub>gs</sub>	Gate-Source Charge			1.73		
Q <sub>gd</sub>	Gate-Drain Charge			3.1		
t <sub>D(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =6.8A R <sub>GEN</sub> =3Ω		7		ns
t <sub>r</sub>	Turn-on Rise Time			46		
t <sub>D(off)</sub>	Turn-off Delay Time			30		
t <sub>f</sub>	Turn-off fall Time			52		
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =7.6A, V <sub>GS</sub> =0V			1.2	V

**Note :**

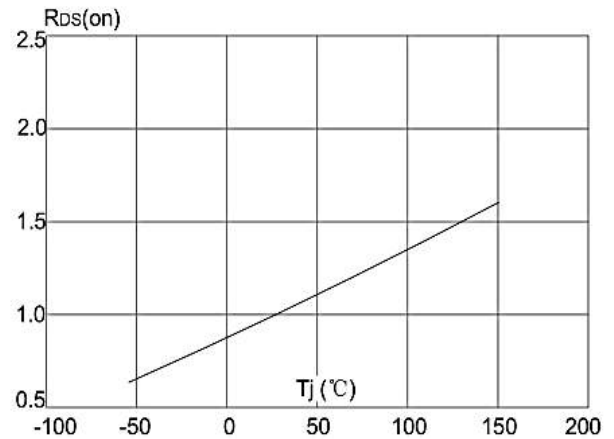
- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≅ 300us , duty cycle ≅ 2%
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

**Typical Characteristics**

**Figure 1: Output Characteristics**

**Figure 2: Typical Transfer Characteristics**

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

**Figure 4: Body Diode Characteristics**

**Figure 5: Gate Charge Characteristics**

**Figure 6: Capacitance Characteristics**

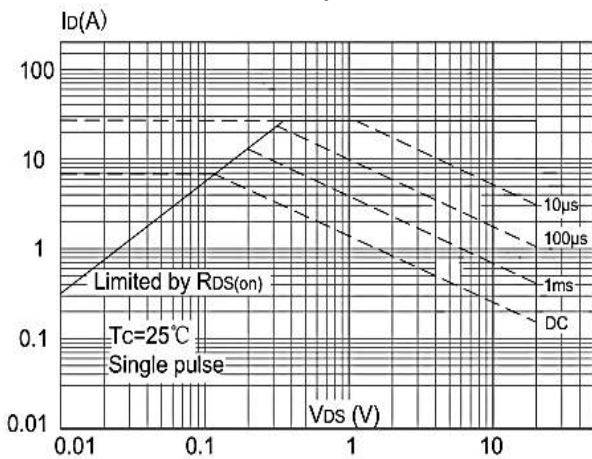
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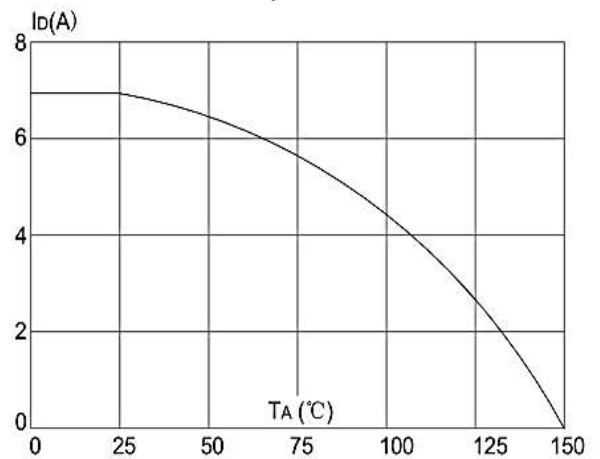
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



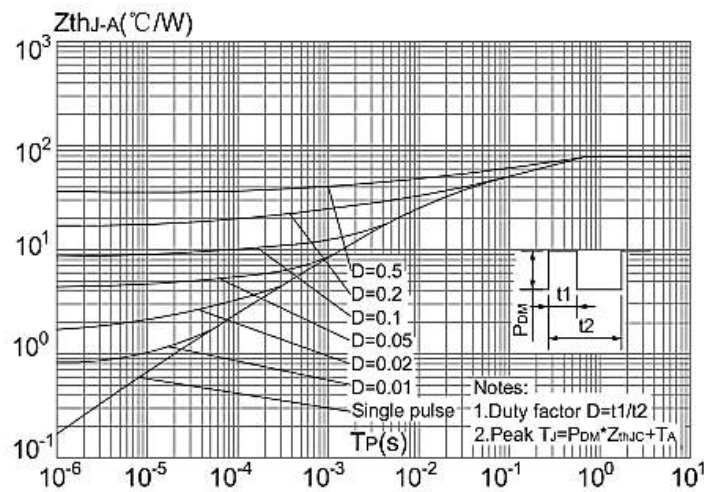
**Figure 8: Normalized on Resistance vs. Junction Temperature**



**Figure 9: Maximum Safe Operating Area vs. Case Temperature**

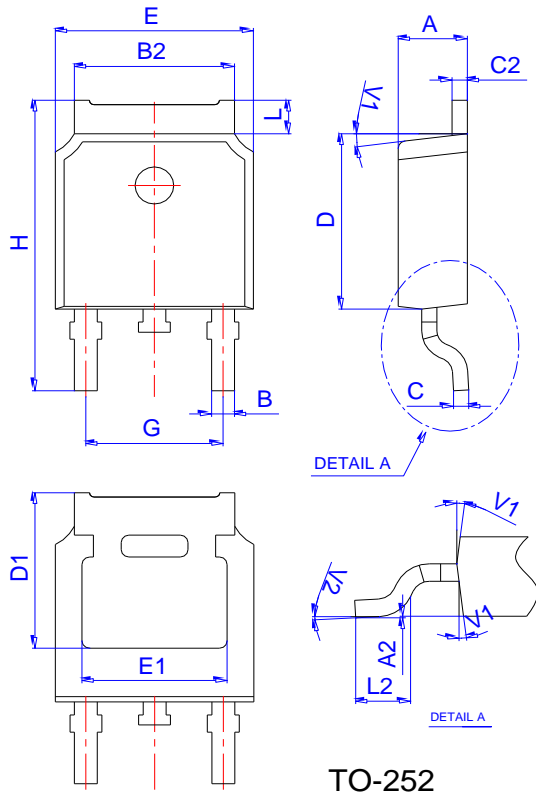


**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**



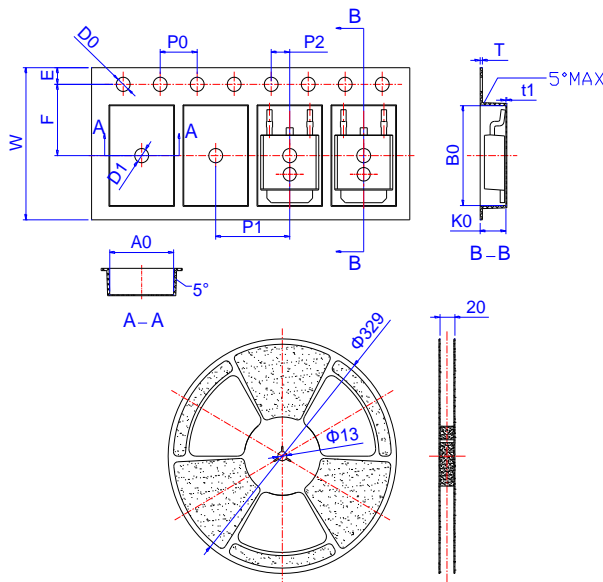
**Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**

### Package Mechanical Data: TO-252-3L



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°

### Reel Specification-TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583