

## 100V N-Channel Enhancement Mode MOSFET

### Description

The 15N10D uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

### General Features

$V_{DS} = 100V$   $I_D = 14.1A$

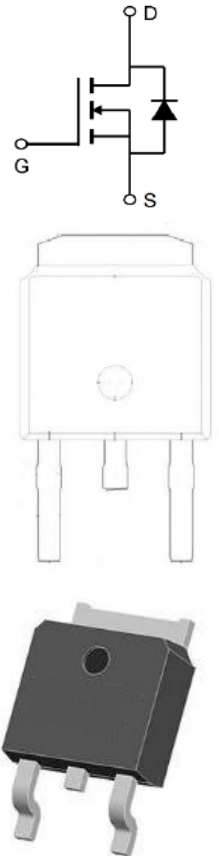
$R_{DS(ON)} < 105m\Omega$  @  $V_{GS}=10V$

### Application

Load Switch

PWM Application

Power management



### 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
$I_D@T_C=25^\circ\text{C}$	Drain Current, $V_{GS} @ 10V$	14.1	A
$I_D@T_C=100^\circ\text{C}$	Drain Current, $V_{GS} @ 10V$	8.1	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	28	A
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation	20.8	W
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	2	W
$E_{AS}$	Single Pulse Avalanche Energy <sup>4</sup>	8	mJ
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{thj-c}$	Maximum Thermal Resistance, Junction-case	6	$^\circ\text{C}/\text{W}$
$R_{thj-a}$	Maximum Thermal Resistance, Junction-ambient	62.5	$^\circ\text{C}/\text{W}$

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

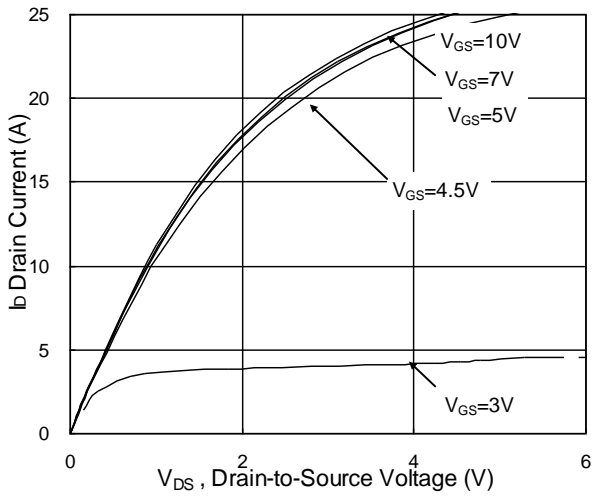
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	107	-	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V,	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	1.5	2.5	V
RDS(on)	Static Drain-Source on-Resistance note3	V <sub>GS</sub> =10V, I <sub>D</sub> =10A	-	88	105	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	-	93	125	mΩ
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz	-	610	-	pF
C <sub>oss</sub>	Output Capacitance		-	40	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	25	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =30V, I <sub>D</sub> =10A, V <sub>GS</sub> =10V	-	12	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	2.2	-	nC
Q <sub>gd</sub>	Gate-Drain("Miller") Charge		-	2.5	-	nC
td(on)	Turn-on Delay Time	V <sub>DS</sub> =30V, I <sub>D</sub> =5A, R <sub>G</sub> =1.8Ω, V <sub>GS</sub> =10V	-	7	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	5	-	ns
td(off)	Turn-off Delay Time		-	16	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	6	-	ns
IS	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	-	-	10	A
ISM	Pulsed Source Current <sup>2,5</sup>		-	-	40	A
VSD	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =10A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I <sub>F</sub> =10A, dI/dt=100A/μs	-	21	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	21	-	nC

Note :

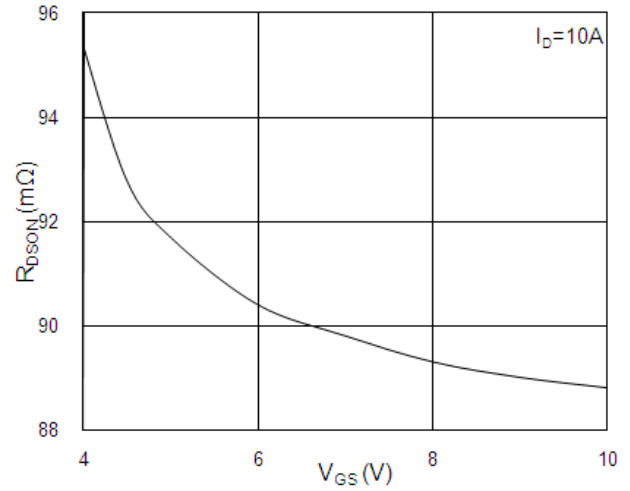
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=25V,V<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=11A
- 4.The power dissipation 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.

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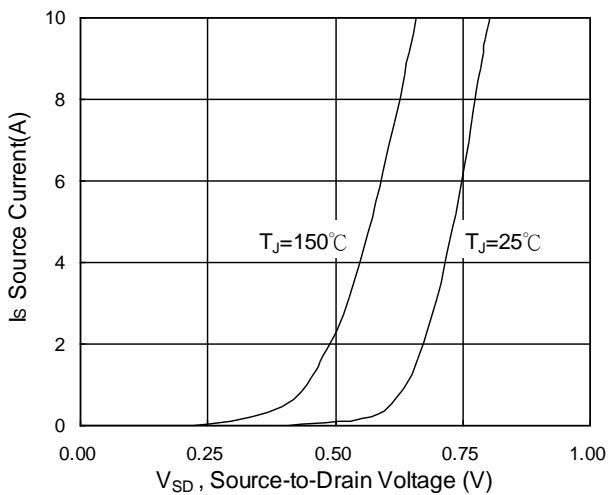
### Typical Characteristics



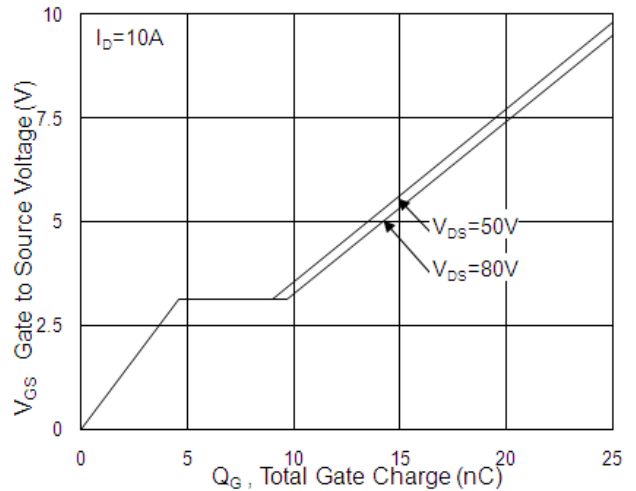
**Fig.1 Typical Output Characteristics**



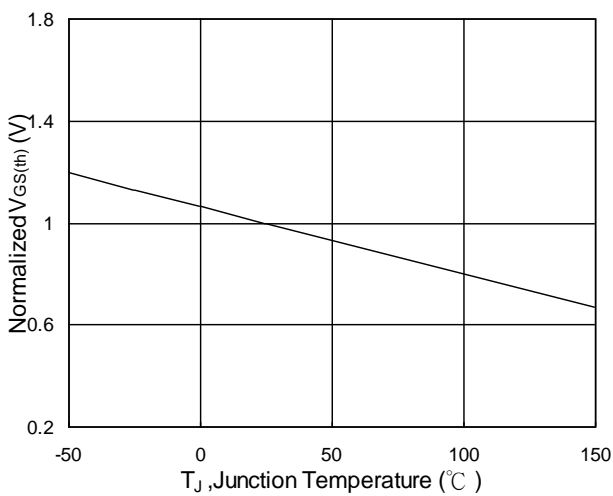
**Fig.2 On-Resistance vs. Gate-Source**



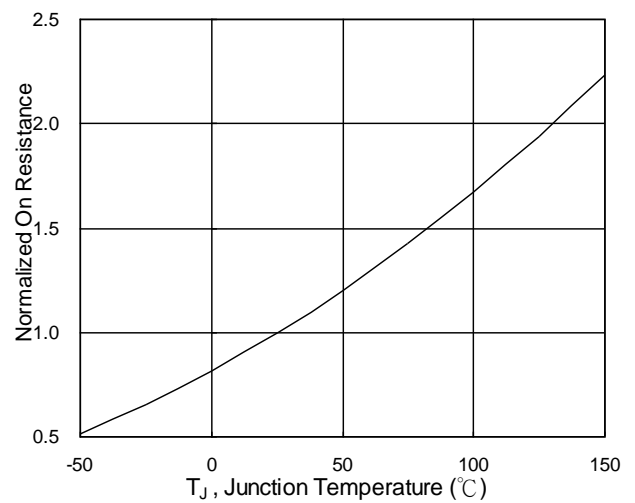
**Fig.3 Forward Characteristics Of Reverse**



**Fig.4 Gate-Charge Characteristics**

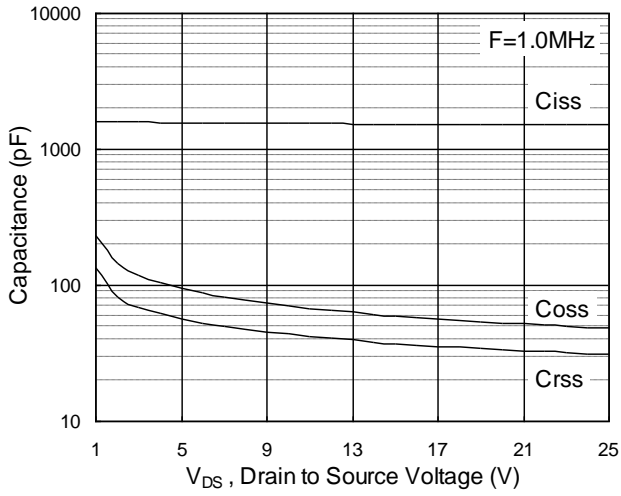


**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**

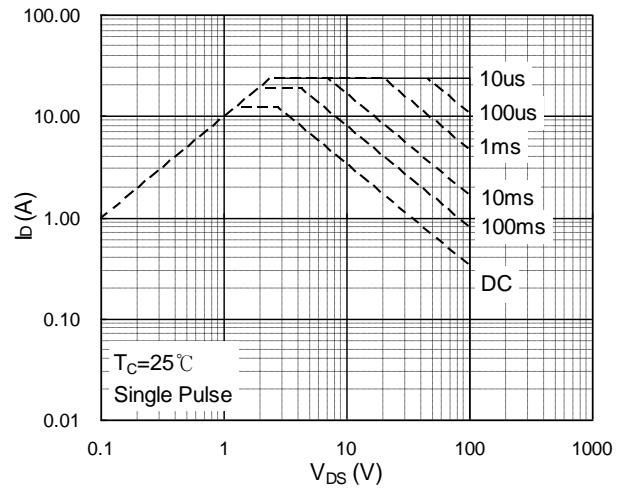


**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

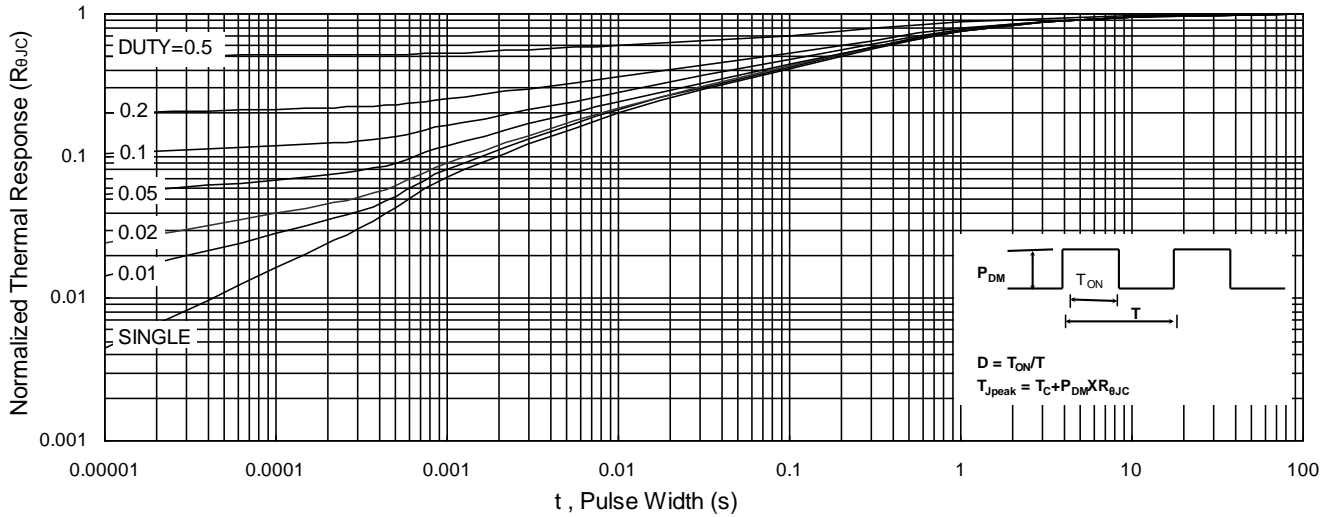
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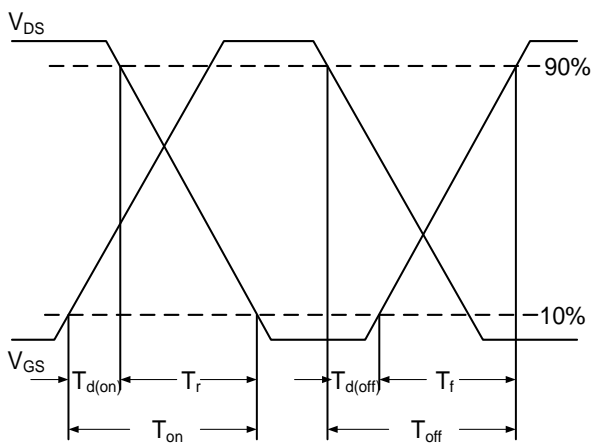
**Fig.7 Capacitance**



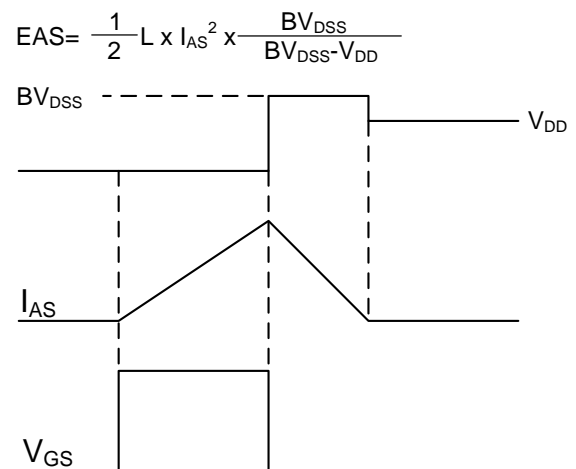
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

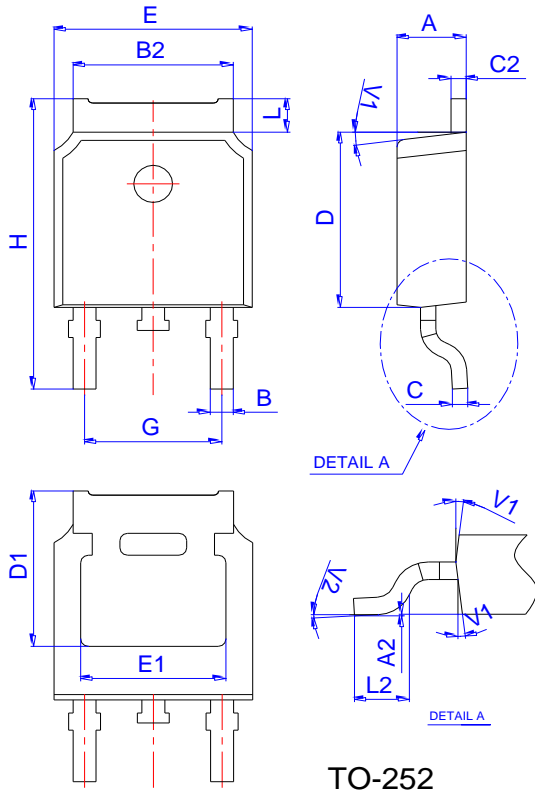


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Switching Waveform**

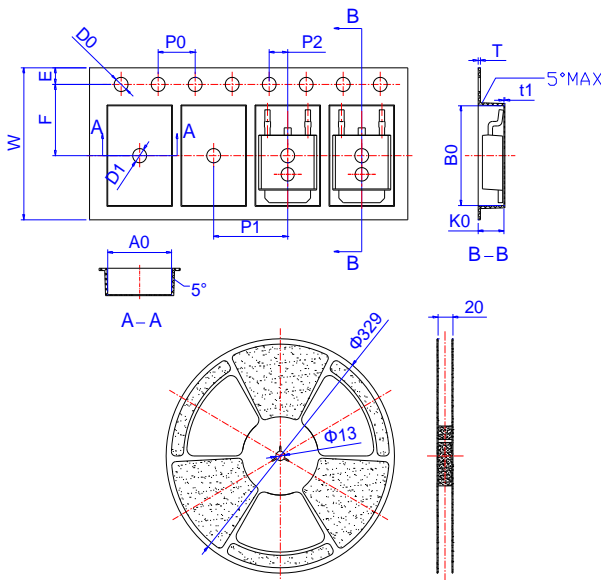
### Package Mechanical Data



TO-252

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