

# N-Channel 700V (D-S) Super Junction Power MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V) at $T_J$ max.	700	
$R_{DS(on)}$ typ. ( $\Omega$ ) at 25 °C	$V_{GS} = 10$ V	0.340

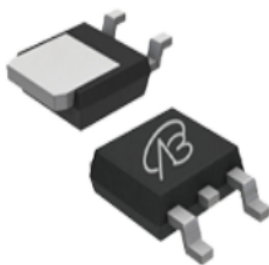
## FEATURES

- Low figure-of-merit (FOM)  $R_{on} \times Q_g$
- Low input capacitance ( $C_{iss}$ )
- Reduced switching and conduction losses
- Ultra low gate charge ( $Q_g$ )
- Avalanche energy rated (UIS)

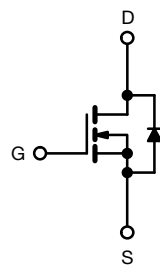


**RoHS**  
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TO-252



Top View



N-Channel MOSFET

## APPLICATIONS


- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
  - High-intensity discharge (HID)
  - Fluorescent ballast lighting
- Industrial
  - Welding
  - Induction heating
  - Motor drives
  - Battery chargers
  - Renewable energy
  - Solar (PV inverters)

ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	$V_{DS}$	700	V
Gate-source voltage	$V_{GS}$	$\pm 30$	
Continuous drain current ( $T_J = 150$ °C)	$V_{GS}$ at 10 V	$T_C = 25$ °C	A
		$T_C = 100$ °C	
Pulsed drain current <sup>a</sup>	$I_{DM}$	36	
Linear derating factor		1.7	W/°C
Single pulse avalanche energy <sup>b</sup>	$E_{AS}$	320	mJ
Maximum power dissipation	$P_D$	180	W
Operating junction and storage temperature range	$T_J, T_{stg}$	-55 to +150	°C
Drain-source voltage slope	$dV/dt$	$T_J = 125$ °C	V/ns
Reverse diode $dV/dt$ <sup>d</sup>			
Soldering recommendations (peak temperature) <sup>c</sup>	For 10 s	260	°C

### Notes

- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{DD} = 100$  V, starting  $T_J = 25$  °C,  $L = 30$  mH,  $R_g = 25$   $\Omega$ ,  $I_{AS} = 6$  A
- 1.6 mm from case
- $I_{SD} \leq I_D$ ,  $dI/dt = 100$  A/ $\mu$ s, starting  $T_J = 25$  °C

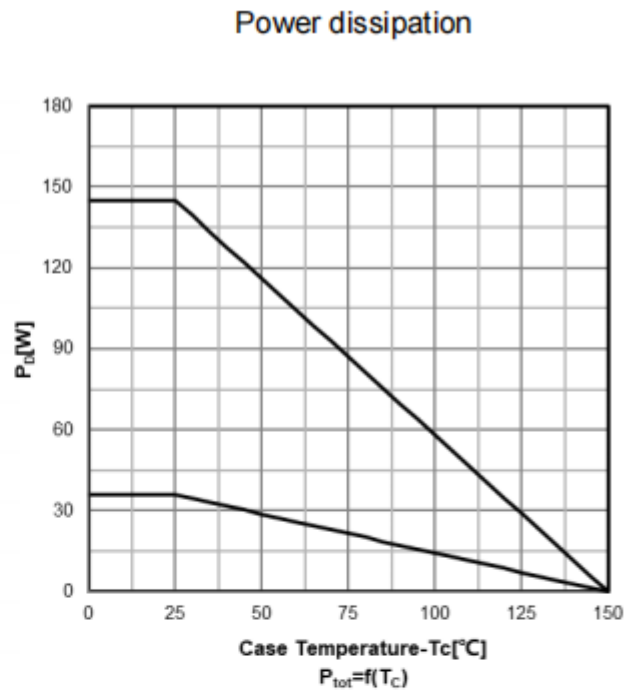
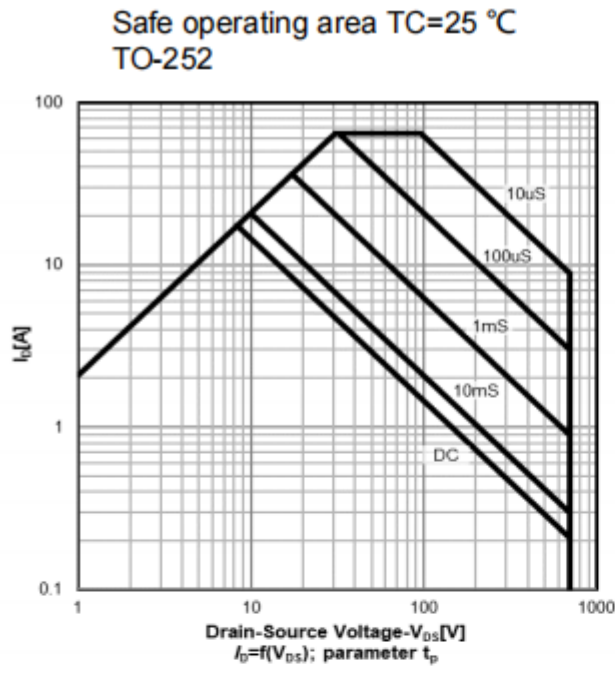
THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R <sub>thJA</sub>	-	62	°C/W
Maximum junction-to-case (drain)	R <sub>thJC</sub>	-	0.85	

SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
<b>Static</b>							
Drain-source breakdown voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA		700	-	-	V
V <sub>DS</sub> temperature coefficient	ΔV <sub>DS</sub> /T <sub>J</sub>	Reference to 25 °C, I <sub>D</sub> = 1 mA		-	1.08	-	V/°C
Gate-source threshold Voltage (N)	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA		2.0	-	4.0	V
Gate-source leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ± 20 V		-	-	± 100	nA
		V <sub>GS</sub> = ± 30 V		-	-	± 1	μA
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 700 V, V <sub>GS</sub> = 0 V		-	-	1	μA
		V <sub>DS</sub> = 560 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C		-	-	10	
Drain-source on-state resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 6A	-	0.340	-	Ω
Forward transconductance	g <sub>fs</sub>	V <sub>DS</sub> = 30 V, I <sub>D</sub> = 5 A		-	8.7	-	S
<b>Dynamic</b>							
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 100 V, f = 1 MHz		-	2200	-	pF
Output capacitance	C <sub>oss</sub>			-	51	-	
Reverse transfer capacitance	C <sub>rss</sub>			-	12	-	
Effective output capacitance, energy related <sup>a</sup>	C <sub>o(er)</sub>			-	48	-	
Effective output capacitance, time related <sup>b</sup>	C <sub>o(tr)</sub>	V <sub>DS</sub> = 0 V to 480 V, V <sub>GS</sub> = 0 V		-	205	-	
Total gate charge	Q <sub>g</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 5 A, V <sub>DS</sub> = 480 V	-	25	-	nC
Gate-source charge	Q <sub>gs</sub>			-	8	-	
Gate-drain charge	Q <sub>gd</sub>			-	10	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 480 V, I <sub>D</sub> = 5 A, V <sub>GS</sub> = 10 V, R <sub>g</sub> = 9.1 Ω		-	12	24	ns
Rise time	t <sub>r</sub>			-	14	23	
Turn-off delay time	t <sub>d(off)</sub>			-	61	110	
Fall time	t <sub>f</sub>			-	16	-	
Gate input resistance	R <sub>g</sub>			f = 1 MHz, open drain		0.3	
<b>Drain-Source Body Diode Characteristics</b>							
Continuous source-drain diode current	I <sub>S</sub>	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	12	A
Pulsed diode forward current	I <sub>SM</sub>			-	-	36	
Diode forward voltage	V <sub>SD</sub>	T <sub>J</sub> = 25 °C, I <sub>S</sub> = 5 A, V <sub>GS</sub> = 0 V		-	-	1.2	V
Reverse recovery time	t <sub>rr</sub>	T <sub>J</sub> = 25 °C, I <sub>F</sub> = I <sub>S</sub> = 5 A, dI/dt = 100 A/μs, V <sub>R</sub> = 25 V		-	416	832	ns
Reverse recovery charge	Q <sub>rr</sub>			-	6.4	12.8	μC
Reverse recovery current	I <sub>RRM</sub>			-	27	-	A

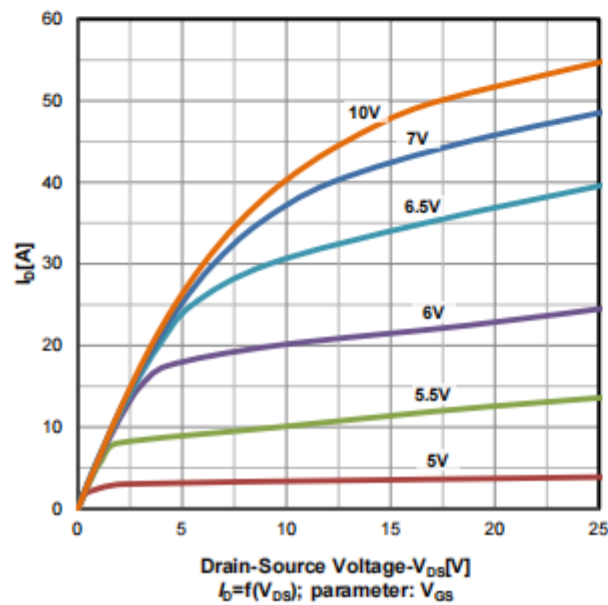
**Notes**

- a. C<sub>oss(er)</sub> is a fixed capacitance that gives the same energy as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 % to 80 % V<sub>DSS</sub>
- b. C<sub>oss(tr)</sub> is a fixed capacitance that gives the same charging time as C<sub>oss</sub> while V<sub>DS</sub> is rising from 0 % to 80 % V<sub>DSS</sub>

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



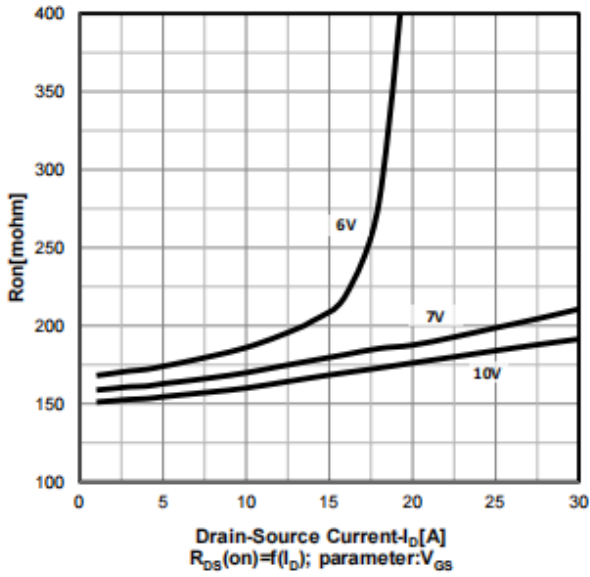
Typ. output characteristics  $T_j = 25\text{ °C}$



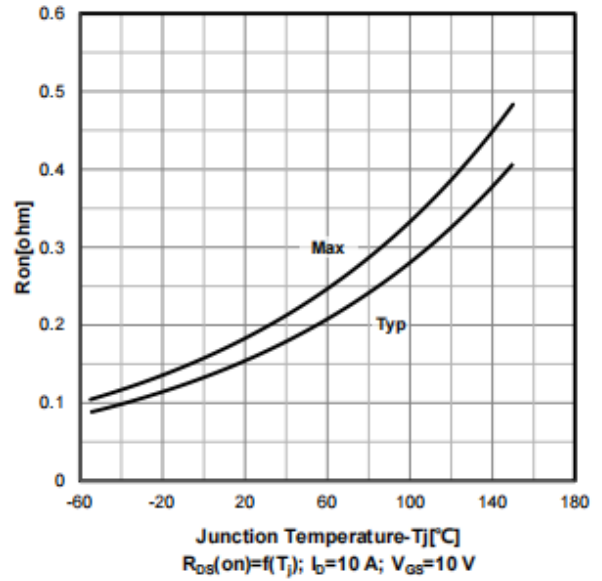
Transfer characteristics



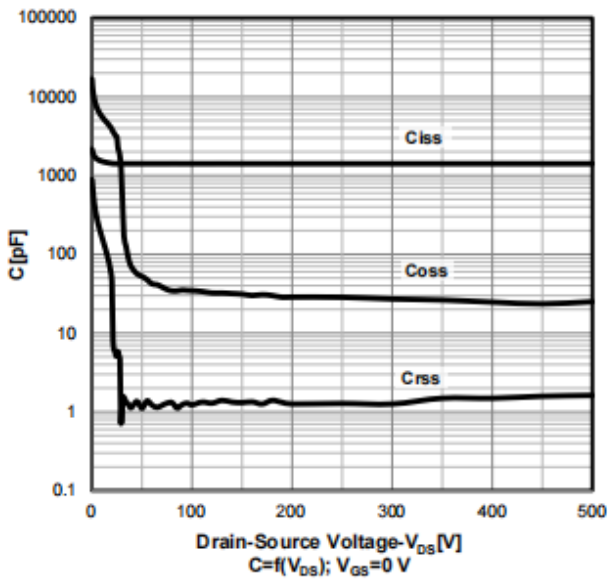
Typ. drain-source on-state resistance



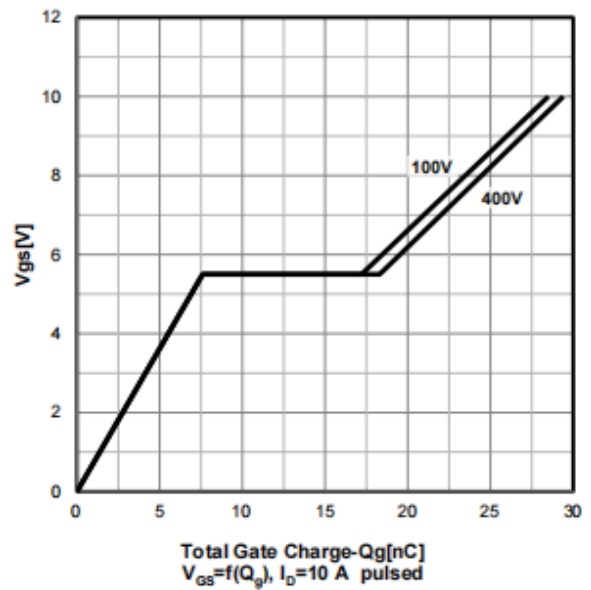
On-resistance vs temperature



Typ. capacitances



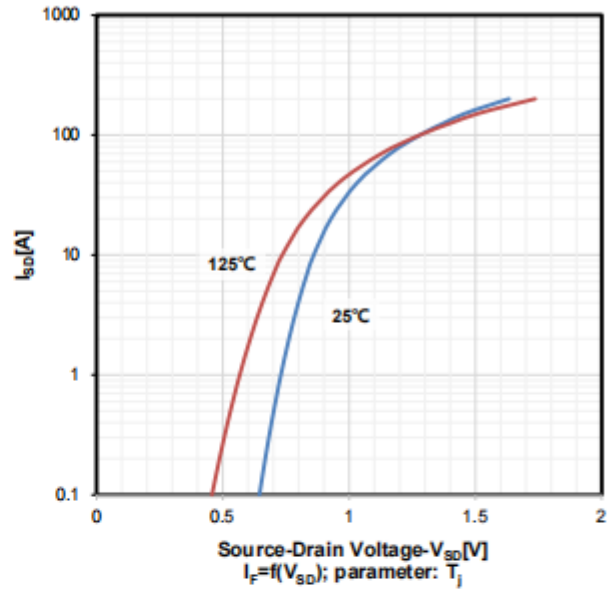
Typ. gate charge characteristics



Drain current vs temperature



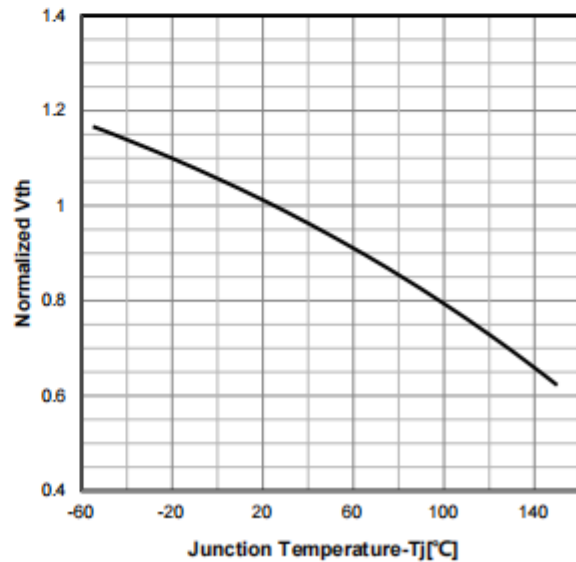
Forward characteristics of reverse diode



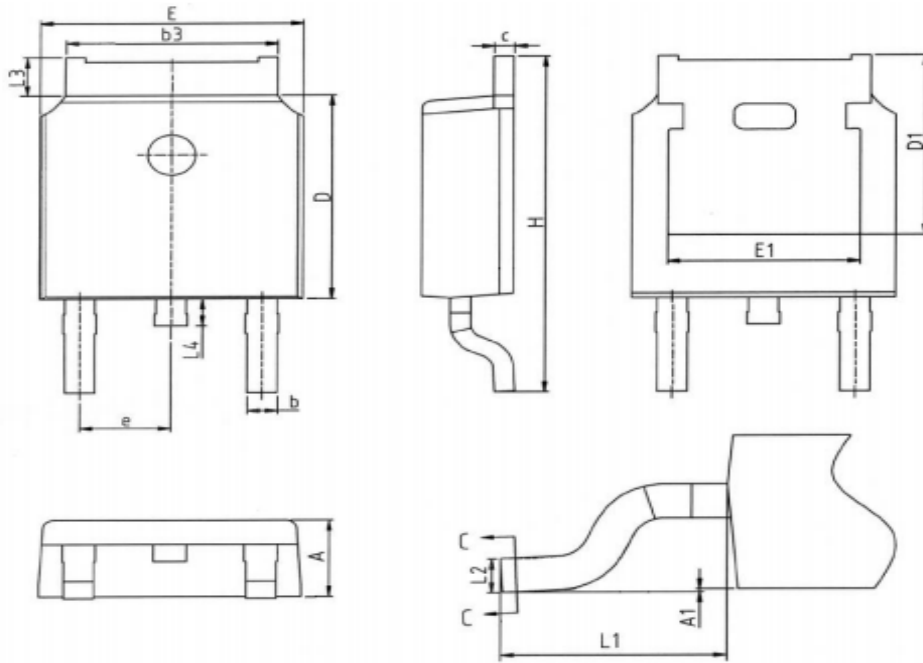
Drain-source breakdown voltage



Normalized Vth characteristics



Package Outline : TO 252



COMMON DIMENSIONS

SYMBOL	UNIT(mm)		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	-	0.127
b	0.66	0.78	0.90
b3	5.16	5.31	5.46
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.75
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L1	2.90REF		
L2	0.51BSC		
L3	0.88	1.08	1.28
L4	0.50	0.80	1.00

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