AT70R280CK

700V Super Junction Power MOSFET

Features

- Low drain-source on-resistance:$R_{DS(ON)}$=0.25Ω(typ)
- Easy to control gate switching
- Enhancement mode: V_{th} = 2.0 to 4.0V
- 100% avalanche tested
- Built-in ESD Diode
- RoHS compliant

## Applications

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

Key Performance Parameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	700	V
$R_{DS(ON),max}$	280	mΩ
I_D	14.6	A
$Q_{g,typ}$	25	nC
I_{DM}	44	A
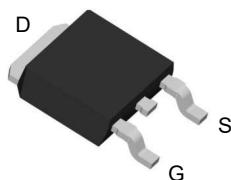
TO-252 Top View
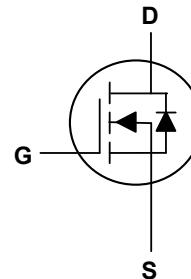
Absolute Maximum Ratings(T_C=25℃, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	700	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current[1]	I_D@T_C=25℃	14.6	A
Continuous Drain Current[1]	I_D@T_C=100℃	9.2	A
Pulsed Drain Current[2]	I_{DM}	44	A
Single Pulse Avalanche Energy[4]	EAS	375	mJ
Avalanche Current	I_{AS}	5	A
MOSFET dv/dt ruggedness, V_{DS} = 0...480V	dv/dt	50	V/ns
Reverse diode dv/dt[3] V_{DS}=0...480V, I_{DS}≤I_D		15	
Total Power Dissipation （T_C=25℃）	P_D	120	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient (Max)	$R_{θJA}$	62	℃/W
Thermal Resistance Junction-Case (Max)	$R_{θJC}$	1.0	℃/W

Electrical Characteristics (T$_J$=25℃, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V , I$_D$=250uA	700	---	---	V
Static Drain-Source On-Resistance	R$_{DS(ON)}$	V$_{GS}$=10V , I$_D$=7.5A	---	250	280	mΩ
Gate Threshold Voltage	V$_{GS(th)}$	V$_{GS}$=V$_{DS}$, I$_D$=220uA	2.0	---	4.0	V
Drain-Source Leakage Current	I$_{DSS}$	V$_{DS}$=700V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=700V, V$_{GS}$=0V, T$_J$=125℃	---	---	100	uA
Gate-Source Leakage Current	I$_{GSS}$	V$_{GS}$=±30V , V$_{DS}$=0V	---	---	±1	uA
Total Gate Charge	Q$_g$	V$_{DD}$=400V , V$_{GS}$=10V , I$_D$=7.5A	---	25	---	nC
Gate-Source Charge	Q$_{gs}$		---	5.2	---	
Gate-Drain Charge	Q$_{gd}$		---	9.3	---	
Turn-On Delay Time	T$_{d(on)}$	V$_{DD}$=400V , R$_G$=15Ω, I$_D$=7.5A	---	17	---	ns
Rise Time	T$_r$		---	18	---	
Turn-Off Delay Time	T$_{d(off)}$		---	89	---	
Fall Time	T$_f$		---	20	---	
Input Capacitance	C$_{iss}$	V$_{DS}$=100V , V$_{GS}$=0V , f=1MHz	---	1100	---	pF
Output Capacitance	C$_{oss}$		---	41	---	
Reverse Transfer Capacitance	C$_{rss}$		---	2.1	---	

Drain-Source Diode Characteristics

| Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I$_S$	T$_C$=25℃	---	---	14.6	A
Pulsed Source Current	I$_{SM}$		---	---	44	A
Diode Forward Voltage	V$_{SD}$	V$_G$=0V , I$_S$=15A ,T$_J$=25℃	---	0.9	1.4	V
Reverse Recovery Time	t$_{rr}$	V$_{DD}$=400V, I$_S$=7.5A, di$_F$/dt=100A/µs	---	295	---	ns
Reverse Recovery Charge	Q$_{rr}$		---	3.1	---	uC
Peak Reverse Recovery Current	I$_{rrm}$		---	20.5	---	A

Note:

1. Limited by T$_{j,max.}$ Maximum Duty Cycle D = 0.50

2. Pulse width t$_p$ limited by T$_{j,max}$

3. Identical low side and high side switch with identical R$_G$

4. V$_{DD}$=50V,R$_G$=25Ω,I$_{AS}$=Id,L=30mH

Typical Characteristics

Typ. drain-source on-state resistance

$R_{DS}(on)=f(I_D)$; parameter:V_{GS}
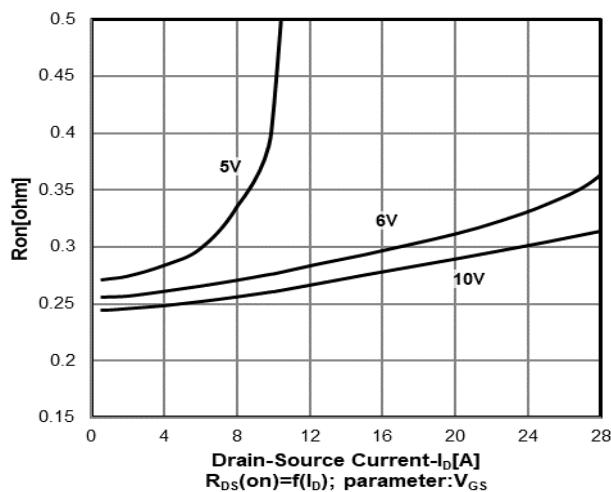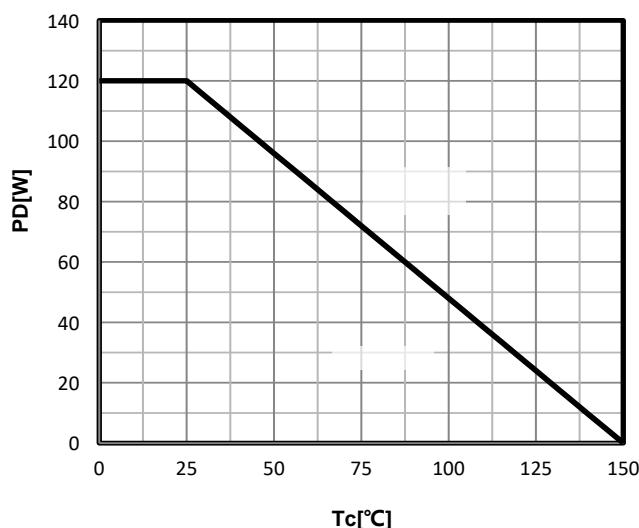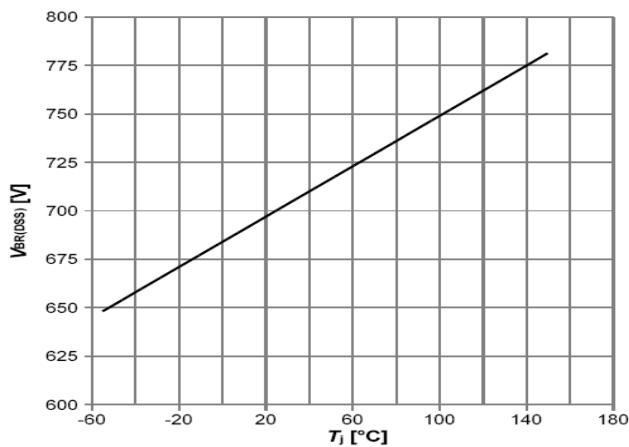
On resistance vs temperature

$R_{DS}(on)=f(T_j)$; I_D=7.5 A; V_{GS}=10 V

Power dissipation
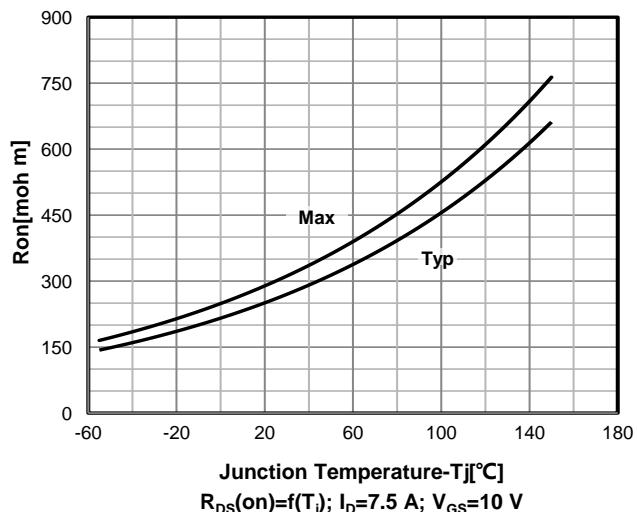
Forward characteristics of reverse diode

$I_F=f(V_{SD})$; parameter: T_j

Drain-source breakdown voltage
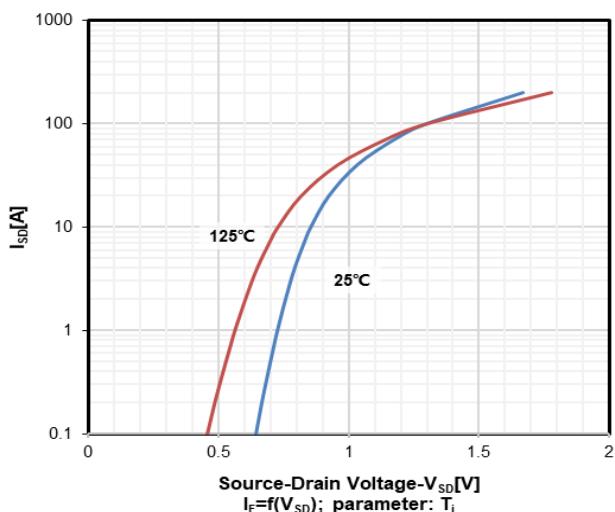
Normalized $V_{GS(th)}$ characteristics

Typ. capacitances

C[pF] vs Drain-Source Voltage-V_{DS}[V]
$C=f(V_{DS})$; $V_{GS}=0$ V
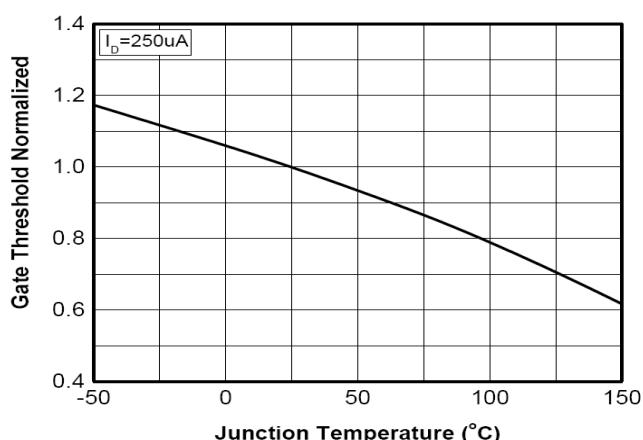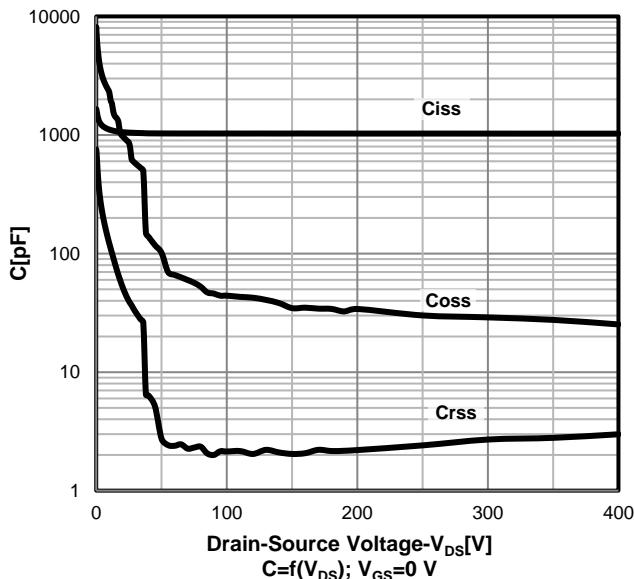
Typ. gate charge characteristics

Vgs[V] vs Total Gate Charge-Qg[nC]
$V_{GS}=f(Q_g)$, $I_D=7.5$ A pulsed
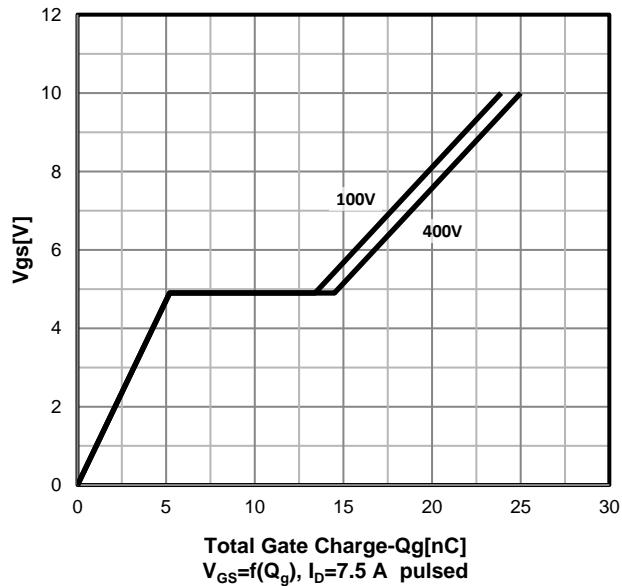
Safe operating area TC=25 ℃

I_D[A] vs Drain-Source Voltage-V_{DS}[V]
$I_D=f(V_{DS})$; parameter t_p
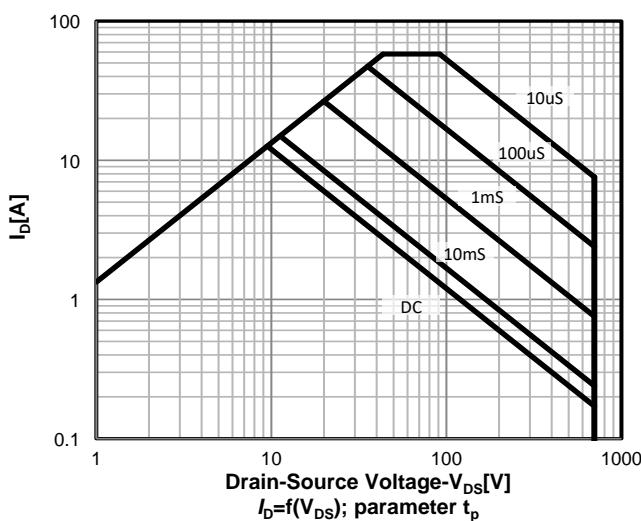
Typ. output characteristics $T_j=25$ ℃

I_D[A] vs Drain-Source Voltage-V_{DS}[V]
$I_D=f(V_{DS})$; parameter: V_{GS}

Max. transient thermal impedance

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pluse

single pulse

Normalized Effective Transient Thermal Impedance vs Square Wave Pulse Duration (s)

1. Duty Cycle, D=T_{on}/T
2. Per Unit Base=R_{thJC} =1℃/W
3. T_{JM}-T_C=$P_{DM}Z_{thJC}(t)$
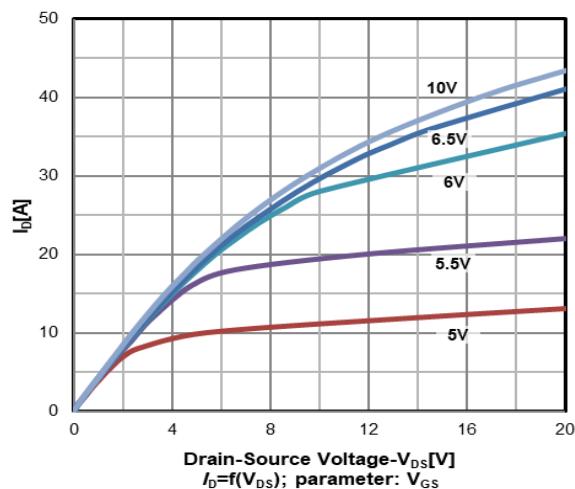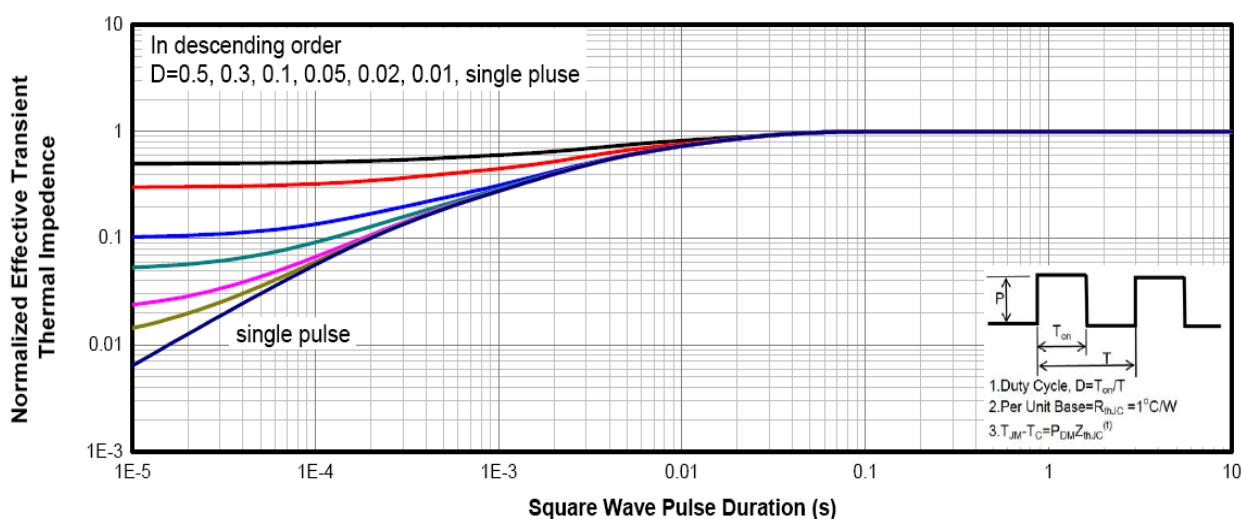
TO-252 Package Outline Dimensions

Dim.	Min.	Max.
A	2.1	2.5
A1	6.3	6.9
B	0.96	1.42
B1	0.74	0.86
B2	0.74	0.94
C	Typ0.5	
D	5.33	5.53
D1	3.65	4.05
E	6.0	6.2
E1	Typ2.29	
E2	Typ4.58	
O	0	0.15
L1	9.9	10.5
L2	Typ1.65	
L3	0.6	1.0
All Dimensions in millimeter		