AT60R070CF

600V Super Junction Power MOSFET

Features

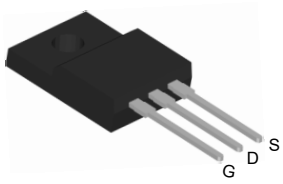
- Low drain-source on-resistance:$R_{DS(ON)}$=0.060Ω(typ)
- Very Low FOM ($R_{DS(on)}$ X Q_g)
- Extremely low switching loss
- 100% avalanche tested
- RoHS compliant

Key Performance Parameters

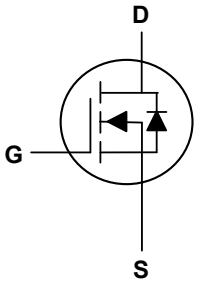
Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	600	V
$R_{DS(ON),max}$	70	mΩ
I_D	45	A
$Q_{g,typ}$	76	nC
I_{DM}	130	A

Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



TO-220F Top View



Absolute Maximum Ratings(T_C=25℃, unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current[1]	I_D	45	A
Pulsed Drain Current[2]	I_{DM}	130	A
Single Pulse Avalanche Energy[4]	EAS	960	mJ
Avalanche Current	I_{AS}	8	A
Repetitive Avalanche Energy	E_{AR}	3.3	mJ
MOSFET dv/dt ruggedness, V_{DS} = 0...400V	dv/dt	50	V/ns
Reverse diode dv/dt[3] V_{DS}=0...400V, I_{SD}≤I_D		15	
Total Power Dissipation （T_C=25℃）	P_D	37	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)	$R_{\theta JA}$	80	℃/W
Thermal Resistance Junction-Case (Max)	$R_{\theta JC}$	3.4	℃/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	600	---	---	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V , I_D=20A	---	60	70	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D=250uA	2.5	---	4.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V , V_{GS}=0V, T_J=25℃	---	---	1	uA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±30V , V_{DS}=0V	---	---	±100	nA
Gate Resistance	R_g	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	1	---	Ω
Total Gate Charge	Q_g	V_{DS}=400V , V_{GS}=10V , I_D=20A	---	76	---	nC
Gate-Source Charge	Q_{gs}		---	22	---	
Gate-Drain Charge	Q_{gd}		---	25	---	
Turn-On Delay Time	$T_{d(on)}$	V_{DS}=400V , R_G=3Ω, I_D=20A , V_{GS}=10V	---	23	---	ns
Rise Time	T_r		---	15	---	
Turn-Off Delay Time	$T_{d(off)}$		---	88	---	
Fall Time	T_f		---	10	---	
Input Capacitance	C_{iss}	V_{DS}=100V , V_{GS}=0V , f=1MHz	---	3200	---	pF
Output Capacitance	C_{oss}		---	140	---	
Reverse Transfer Capacitance	C_{rss}		---	3.7	---	

Drain-Source Diode Characteristics

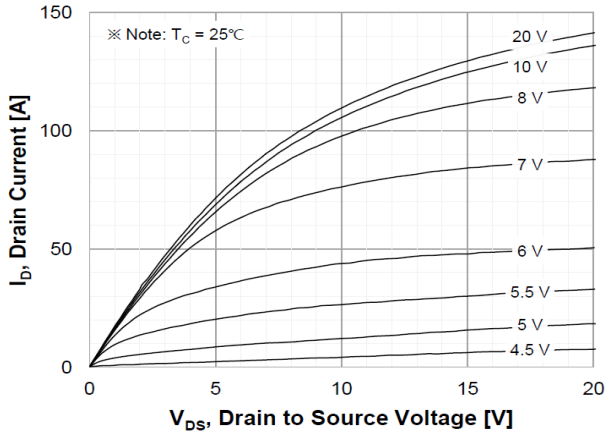
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Continuous Source Current	I_S	T_C=25℃	---	---	45	A
Pulsed Source Current	I_{SM}		---	---	130	A
Diode Forward Voltage	V_{SD}	V_G=0V , I_S=20A ,T_J=25℃	---	0.9	1.4	V
Reverse Recovery Time	t_{rr}	V_{DD}=400V, I_S=20A, di_F/dt=100A/μs	---	420	---	ns
Reverse Recovery Charge	Q_{rr}		---	7.4	---	uC
Peak Reverse Recovery Current	I_{rrm}		---	35	---	A

Note:

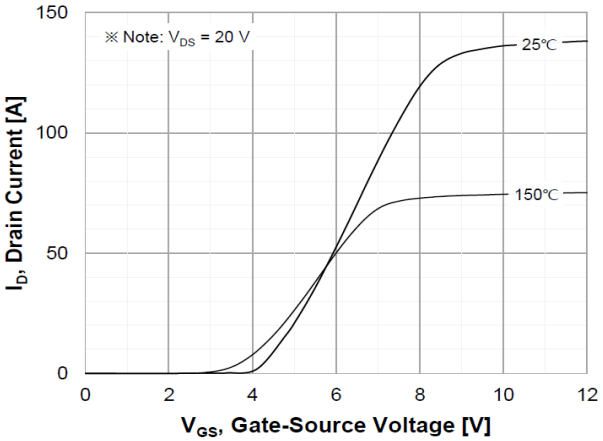
1. Limited by $T_{j,max.}$ Maximum Duty Cycle D = 0.50
2. Pulse width t_p limited by $T_{j,max}$
3. Identical low side and high side switch with identical R_G
4. V_{DD}=100V,I_{AS}=Id, L=30mA,Starting T_J=25℃

Typical Characteristics

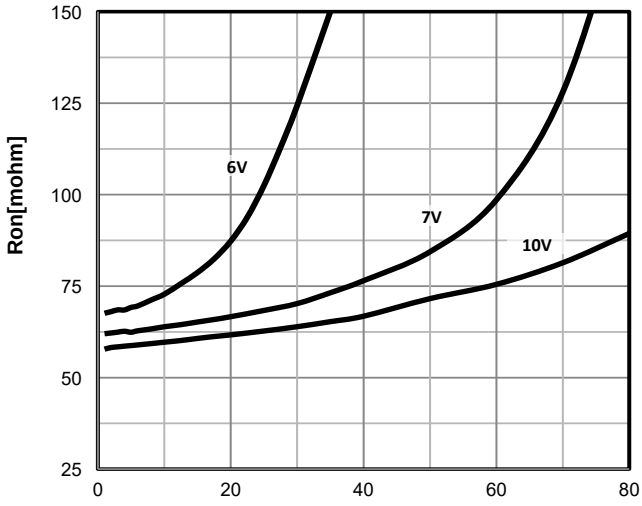
Typ. output characteristics T_j=25 ℃



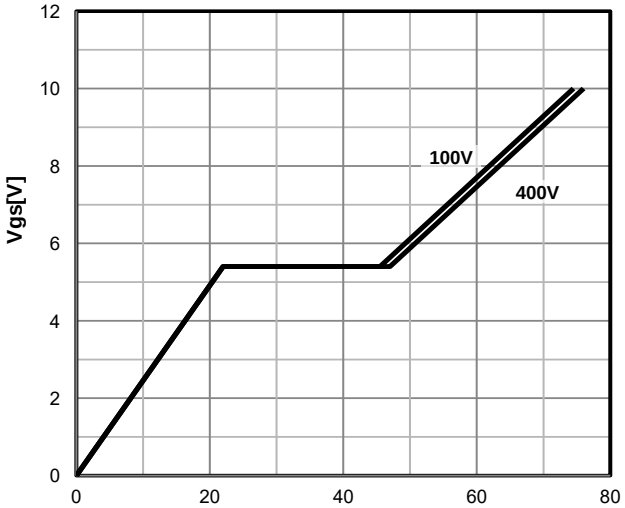
Transfer characteristics



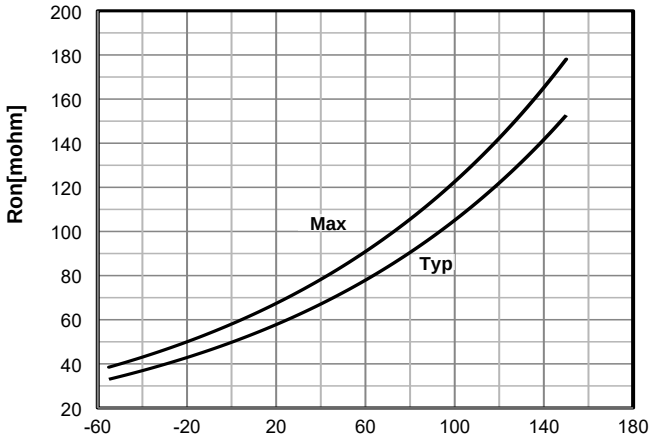
Typ. drain-source on-state resistance



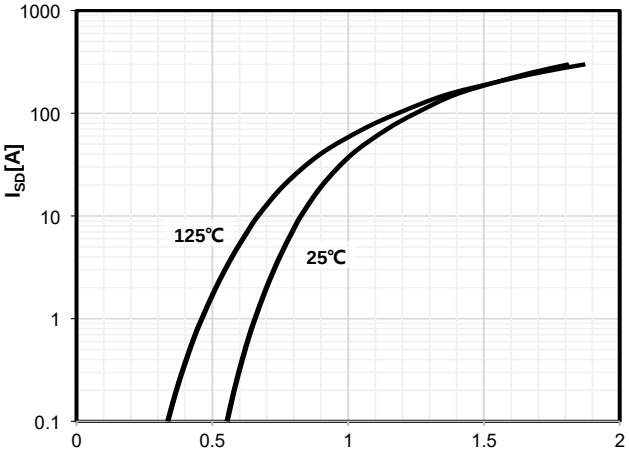
Typ. gate charge characteristics



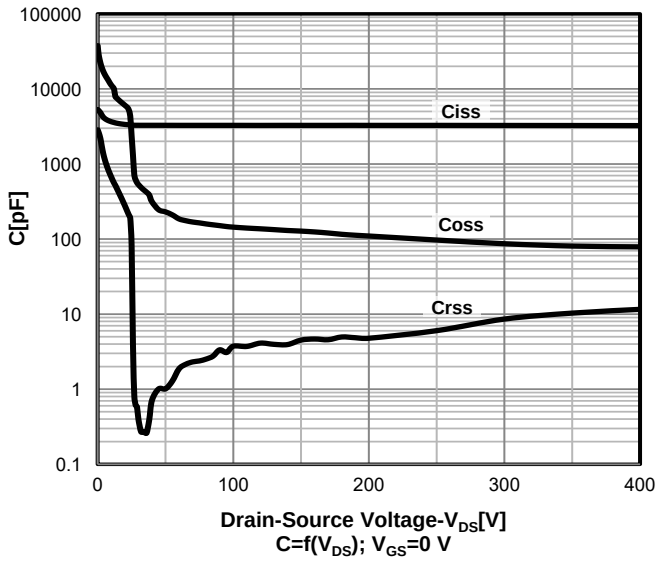
On-resistance vs temperature



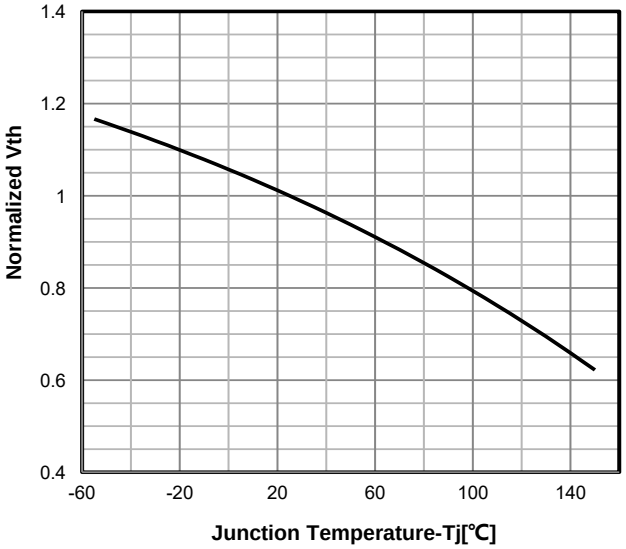
Forward characteristics of reverse diode



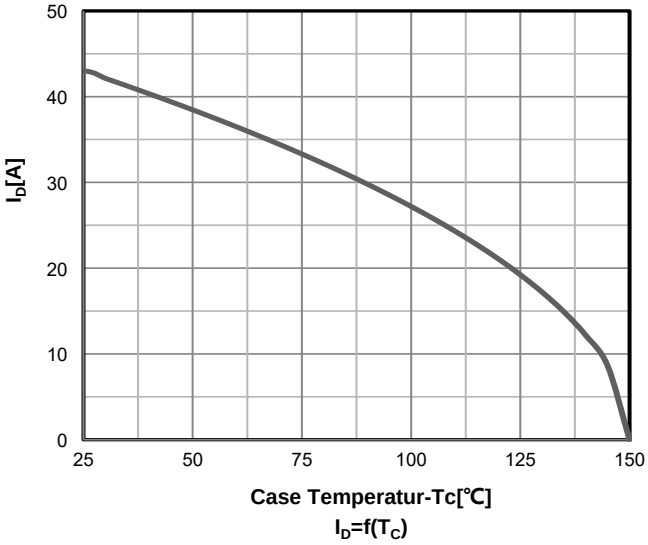
Typ. capacitances



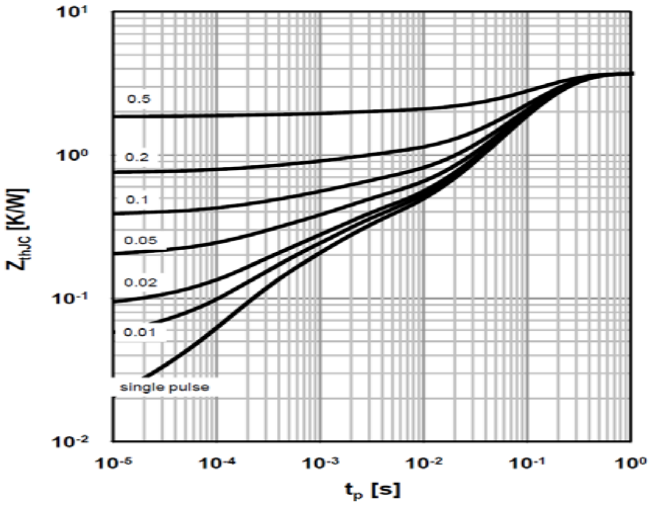
Normalized $V_{GS(th)}$ characteristics



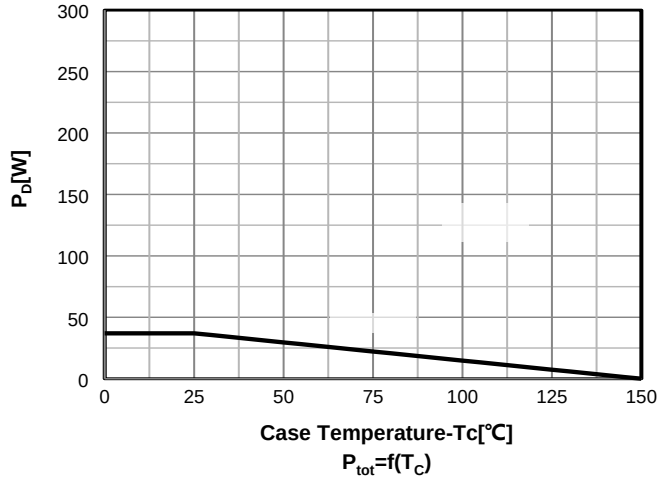
Drain current vs temperature



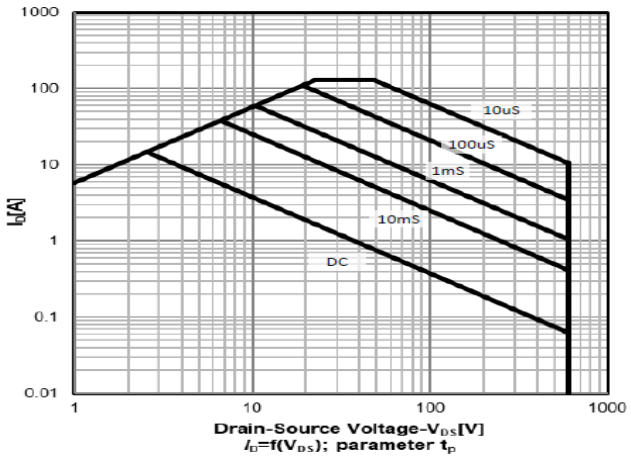
Max. transient thermal impedance parameter: D=tp/T



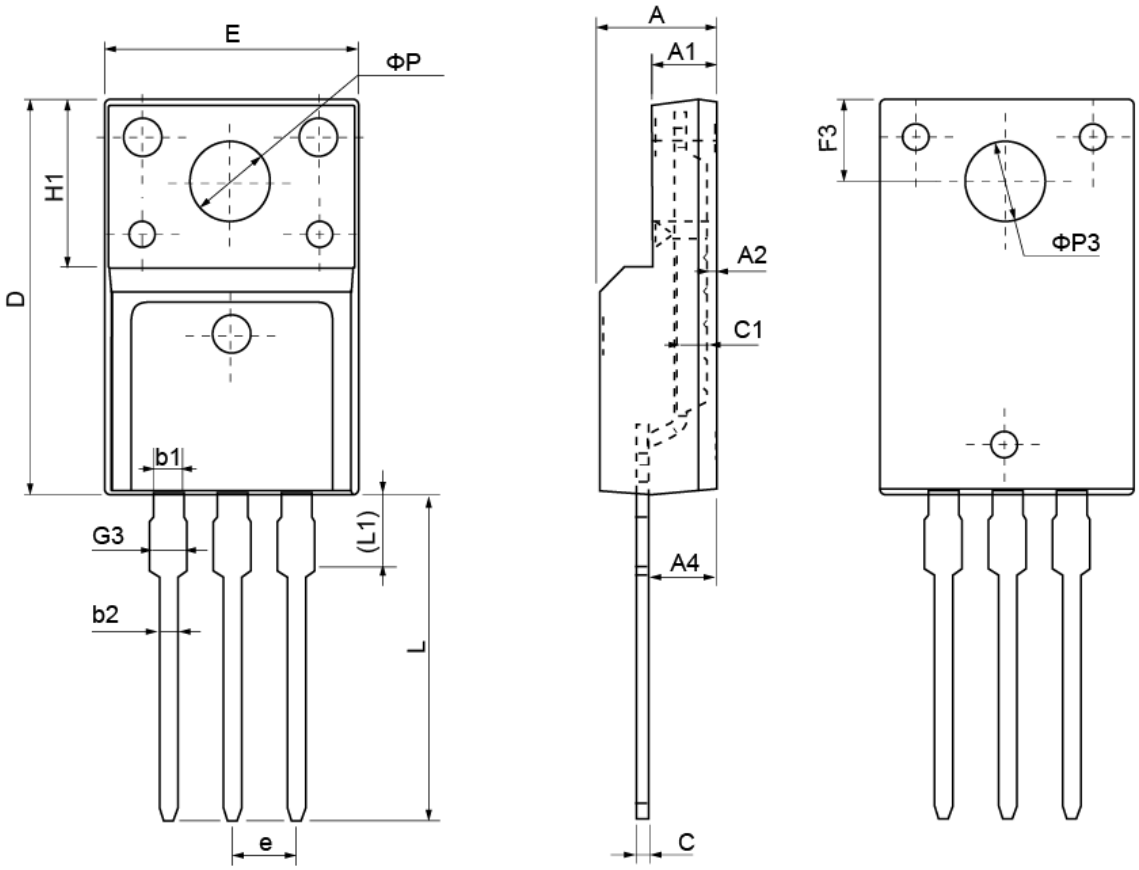
Power dissipation



Safe operating area TC=25 ℃



TO-220F Package Outline Dimensions



Symbol	Dimensions (unit:mm)			Symbol	Dimensions (unit:mm)		
	Min	Typ	Max		Min	Typ	Max
A	4.40	4.70	5.00	**H1**	6.70 REF		
A1	2.30	2.55	2.80	**L**	12.30	12.98	13.30
A2	0.30	0.50	0.70	**L1**	2.95	3.10	3.50
A4	2.45	2.80	3.05	**ϕP**	3.03	3.20	3.50
c	0.30	0.50	0.70	**ϕP3**	3.15	3.45	3.65
c1	1.20	1.30	1.40	**b1**	1.10	1.30	1.45
D	15.40	15.90	16.40	**b2**	0.60	0.80	1.00
E	9.86	10.16	10.46	**F3**	3.05	3.30	3.55
e	2.54 BSC			**G3**	1.15	1.35	1.55