

General Description

The B50T070F N-Channel MOSFET uses advanced technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge.

Application

- High frequency switching mode power supply
- Electronic ballast
- UPS
- Motor Driver

Features

- Low Gate Charge cause lower driving requirements and switching loss
- Low C_{RSS} (typical 3.2pF)
- Fast switching
- Improved dv/dt capability
- 100% Avalanche Tested
- Fast Reverse Recovery

Typical Application

V_{DS}	500	V
$R_{DS(ON) MAX}$	1.3	Ω
I_D	7	A

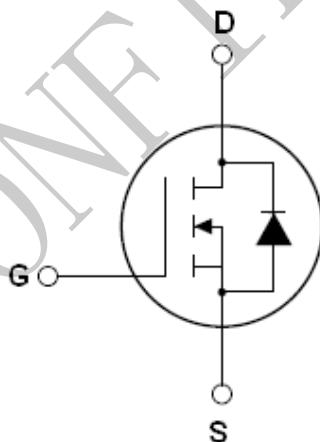
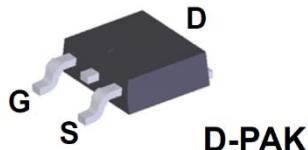


Figure 1. Schematic Diagram

Ordering Information

Part Number	Package	Operating Temperature	Packing Type	Marking
B50T070F	TO-252	-40 °C to 105 °C	Tape & Reel 2,500pcs/Reel	B50T070 XXXXXKP XXXXWWF

Pin Configuration and Marking Information



B50T070

XXXXXKP

XXXXWWF

XXXXX: Lot Code

WW: Week

Figure 2. Pin Configuration and Marking Information

Pin Definition

Pin No.	Name	Description
1	G	Gate
2	D	Drain
3	S	Source

Absolute Maximum Rating (note 1) (Unless otherwise specified, TA=25°C)

Symbol	Parameters	Range	Unit
V _{DS}	Drain-Source Voltage (V _{GS} =0V)	500	V
V _{GS}	Gate-Source Voltage (V _{DS} =0V)	±30	V
I _D (DC)	Continuous Drain Current at T _c =25°C(note 2)	7.0	A
	Continuous Drain Current at T _c =100°C(note 2)	4.7	A
I _{DM} (pulse)	Pulsed drain current (note 3)	28	A
P _D	Maximum Power Dissipation(T _c =25°C)	56	W
E _A S	Single pulse avalanche energy (note 4)	465	mJ
I _{AR}	Avalanche current (note 3)	7.0	A
E _{AR}	Repetitive Avalanche energy, t _{AR} limited by T _{jmax} (note 3)	5.6	mJ
dv/dt	Reverse diode dv/dt, V _{DS} ≤400 V,I _{SD} <I _D	4.5	V/ns
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C
R _{thJC}	Thermal Resistance, Junction-to-Case	2.2	°C /W
R _{thJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C /W

Note 1: Stress beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. Under "recommended operating conditions" the device operation is assured, but some particular parameter may not be achieved. The electrical characteristics table defines the operation range of the device, the electrical characteristics is assured on DC and AC voltage by the test program. For the parameters without minimum and maximum value in the EC table, the typical value defines the operation range, the accuracy is not guaranteed by spec.

Note 2: Limited by maximum junction temperature.

Note 3: Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 4: T_j=25 °C,V_{DD}=50V,V_G=10V, R_G=25Ω

Electrical Characteristics (note 5, 6) (Unless otherwise specified, $T_A=25^\circ C$)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
On/off states						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Id_{SS}	Zero Gate Voltage Drain Current($T_c=25^\circ C$)	$V_{DS}=500V, V_{GS}=0V$	-	-	10	μA
Id_{SS}	Zero Gate Voltage Drain Current($T_c=125^\circ C$)	$V_{DS}=400V, V_{GS}=0V$	-	-	300	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=3.5A$	-	1.1	1.3	Ω
Dynamic Characteristics						
g_{FS}	Forward Transconductance	$V_{DS}=40V, I_D=3.5A$	-	2.8	-	S
C_{lss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1.0MHz$	-	1010	1262	pF
C_{oss}	Output Capacitance		-	79	99	pF
C_{rss}	Reverse Transfer Capacitance		-	3.2	3.9	pF
Q_g	Total Gate Charge	$V_{DS}=400V, I_D=7A, V_{GS}=10V$	-	22	26	nC
Q_{gs}	Gate-Source Charge		-	5.2	-	nC
Q_{gd}	Gate-Drain Charge		-	7.5	-	nC
Switching times						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=250V, I_D=7A, R_G=25\Omega, V_{GS}=10V$	-	25	32	ns
t_r	Turn-on Rise Time		-	22	28	ns
$t_{d(off)}$	Turn-Off Delay Time		-	62	80	ns
t_f	Turn-Off Fall Time		-	32	41	ns
Source- Drain Diode Characteristics						
I_{SD}	Source-drain current(Body Diode)	$T_c=25^\circ C$	-	-	7.0	A
I_{SDM}	Pulsed Source-drain current(Body Diode)		-	-	28	A
V_{SD}	Forward On Voltage	$T_j=25^\circ C, I_{SD}=7A, V_{GS}=0V$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$T_j=25^\circ C, I_F=7A, di/dt=100A/\mu s$	-	87	-	ns
Q_{rr}	Reverse Recovery Charge		-	0.2	-	uC

Note 5: Production testing of the chip is performed at $25^\circ C$.

Note 6: The maximum and minimum parameters specified are guaranteed by test, the typical value are guaranteed by design, characterization and statistical analysis.

Typical Electrical and Thermal Characteristics Curves

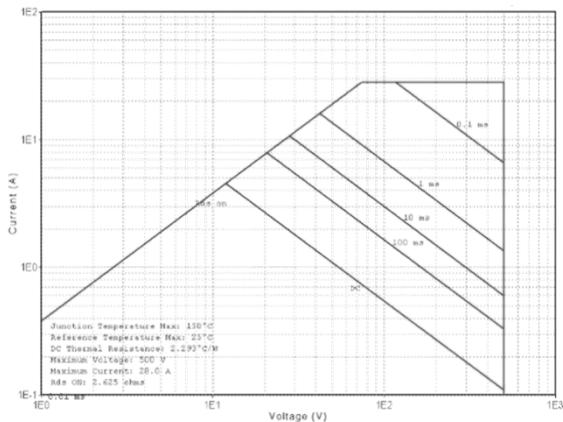


Figure 3. Safe Operating Area

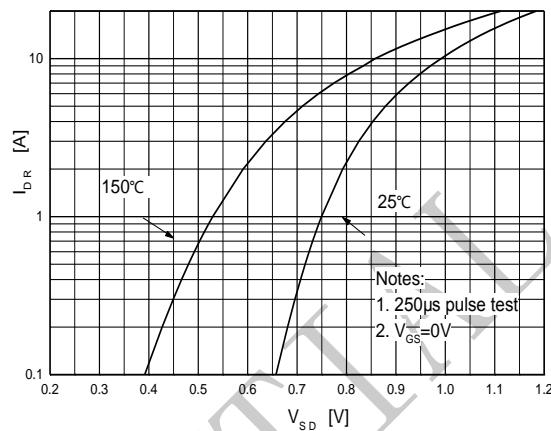


Figure 4. Source-Drain Diode Forward Voltage

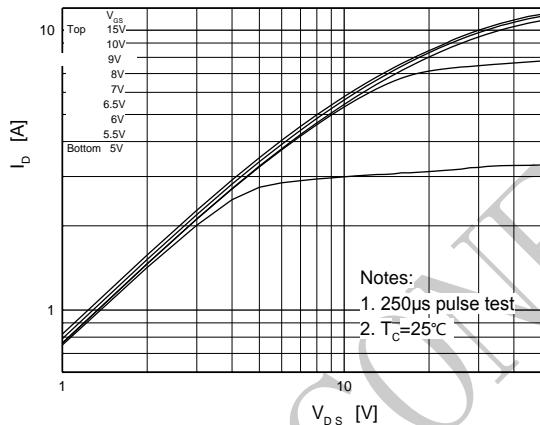


Figure 5. Output Characteristics

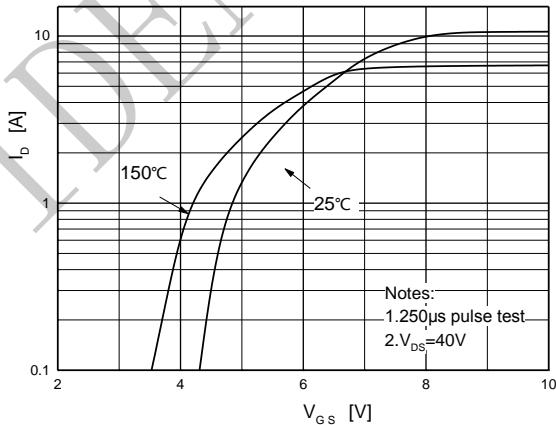


Figure 6. Transfer Characteristics

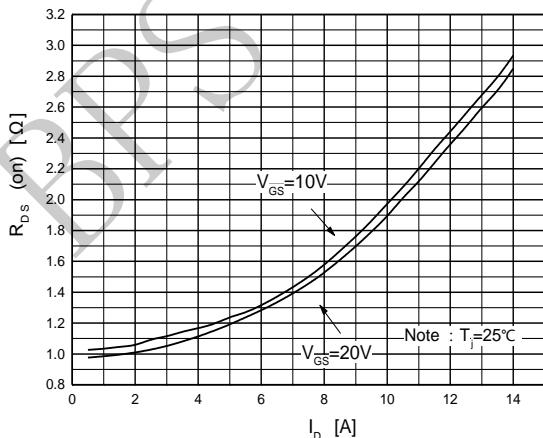


Figure 7. Static Drain-Source ON Resistance

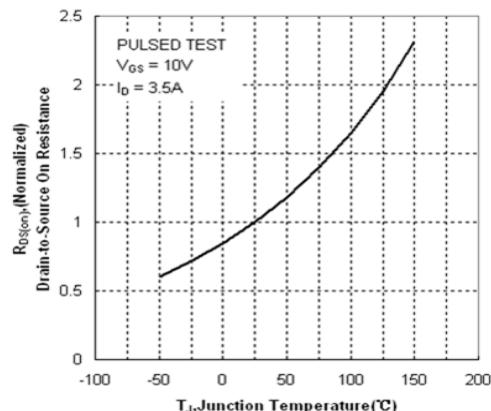


Figure 8. $R_{DS(ON)}$ vs Junction Temperature

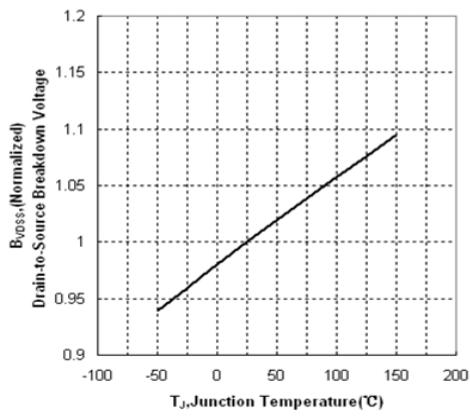


Figure 9. BV_{dss} vs Junction Temperature

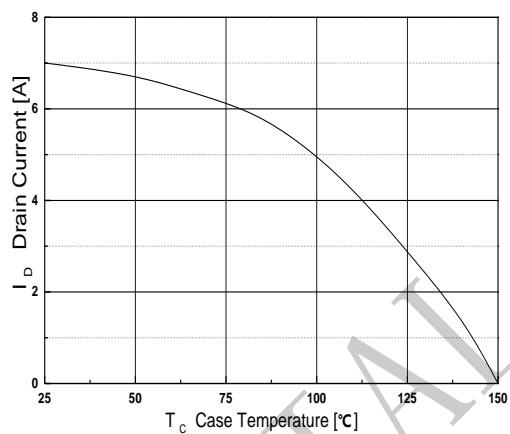


Figure 10. Maximum Id vs Junction Temperature

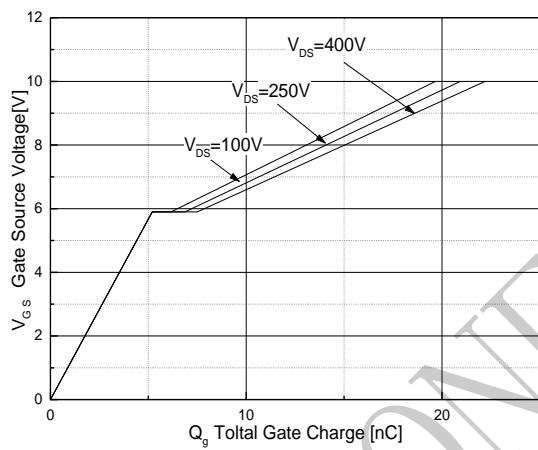


Figure 11. Gate charge waveforms

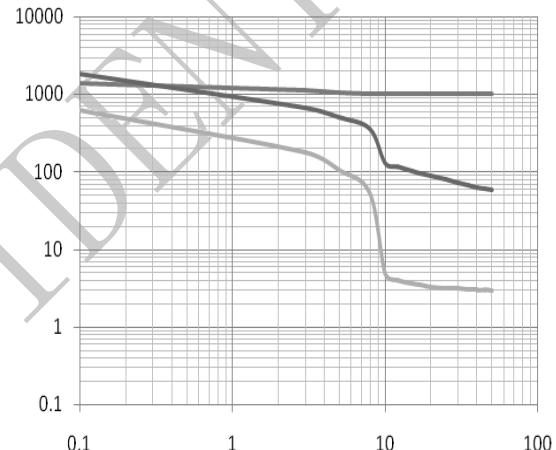


Figure 12. Capacitance

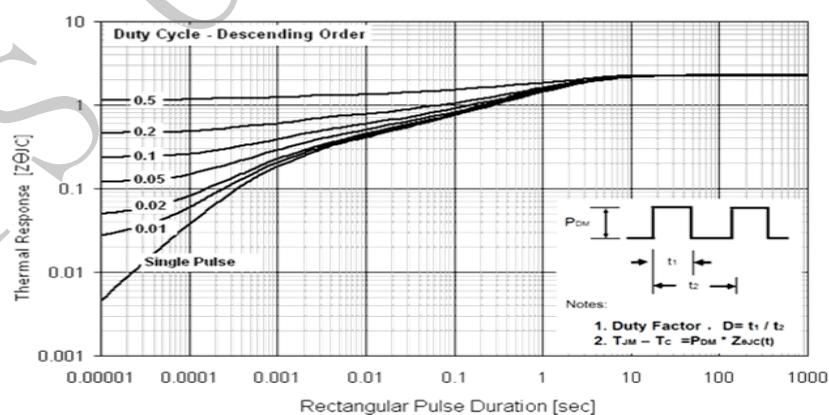
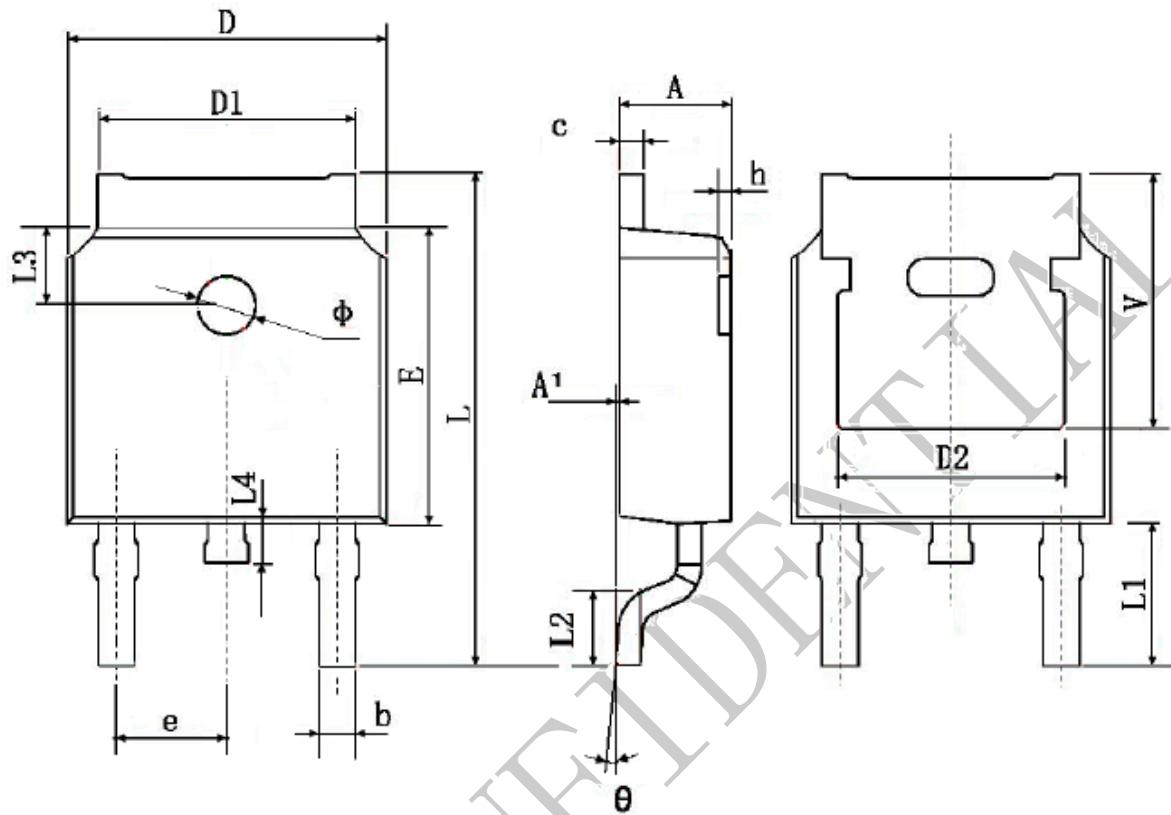


Figure 13. Transient Thermal Impedance

Package Information (TO-252)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	