N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

Low gate-charge

Simple drive requirement

Fast switching
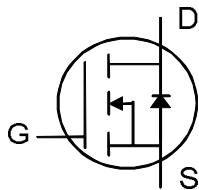
BV_{DSS}	600/650/700V
$R_{DS(ON)}$	2.4Ω
I_D	4A
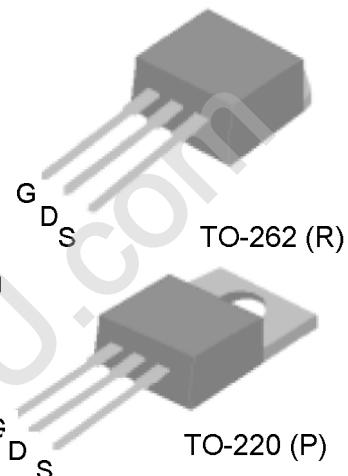
TO-262 (R)

TO-220 (P)

Description

The SSM04N70BR is in a TO-262 package, which is widely used for commercial and industrial applications, and is well suited for universal 90~265VAC off-line AC/DC converter applications. The SSM04N70BP is in the TO-220 package which has a mounting hole on the tab for attaching to a heat sink. These devices are manufactured with an advanced process, providing high blocking voltage to overcome voltage surge and sag in the toughest power systems with the best combination of fast switching, ruggedized design and cost-effectiveness.

Absolute Maximum Ratings

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage	- /-A/-H	600/650/700	V
V_{GS}	Gate-Source Voltage		± 30	V
I_D @ T_C=25°C	Continuous Drain Current, V_{GS} @ 10V		4	A
I_D @ T_C=100°C	Continuous Drain Current, V_{GS} @ 10V		2.5	A
I_{DM}	Pulsed Drain Current[1]		15	A
P_D @ T_C=25°C	Total Power Dissipation		62.5	W
	Linear Derating Factor		0.5	W/°C
E_{AS}	Single Pulse Avalanche Energy[2]		100	mJ
I_{AR}	Avalanche Current		4	A
E_{AR}	Repetitive Avalanche Energy		4	mJ
T_{STG}	Storage Temperature Range		-55 to 150	°C
T_J	Operating Junction Temperature Range		-55 to 150	°C

Thermal Data

Symbol	Parameter		Value	Unit
Rthj-c	Thermal Resistance Junction-case	Max.	2.0	°C/W
Rthj-a	Thermal Resistance Junction-ambient	Max.	62	°C/W

Electrical Characteristics @ T_j=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV$_{DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA / -	600	-	-	V
		V_{GS}=0V, I_D=250uA / A	650	-	-	V
		V_{GS}=0V, I_D=250uA / H	700	-	-	V
ΔBV$_{DSS}$/ ΔTj	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.6	-	V/°C
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=2A	-	-	2.4	Ω
V$_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	2	-	4	V
g$_{fs}$	Forward Transconductance	V_{DS}=10V, I_D=2A	-	2.5	-	S
I$_{DSS}$	Drain-Source Leakage Current (T_j=25°C)	V_{DS}=600V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_j=150°C)	V_{DS}=480V,V_{GS}=0V	-	-	100	uA
I$_{GSS}$	Gate-Source Leakage	V_{GS}= $\pm$ 30V	-	-	$\pm$100	nA
Q$_g$	Total Gate Charge[3]	I_D=4A	-	16.7	-	nC
Q$_{gs}$	Gate-Source Charge	V_{DS}=480V	-	4.1	-	nC
Q$_{gd}$	Gate-Drain ("Miller") Charge	V_{GS}=10V	-	4.9	-	nC
t$_{d(on)}$	Turn-on Delay Time[3]	V_{DD}=300V	-	11	-	ns
t$_r$	Rise Time	I_D=4A	-	8.3	-	ns
t$_{d(off)}$	Turn-off Delay Time	R_G=10Ω,V_{GS}=10V	-	23.8	-	ns
t$_f$	Fall Time	R_D=75Ω	-	8.2	-	ns
C$_{iss}$	Input Capacitance	V_{GS}=0V	-	950	-	pF
C$_{oss}$	Output Capacitance	V_{DS}=25V	-	65	-	pF
C$_{rss}$	Reverse Transfer Capacitance	f=1.0MHz	-	6	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I$_S$	Continuous Source Current (Body Diode)	V_D=V_G=0V , V_S=1.5V	-	-	4	A
I$_{SM}$	Pulsed Source Current (Body Diode)[1]		-	-	15	A
V$_{SD}$	Forward On Voltage[3]	T_j=25°C, I_S=4A, V_{GS}=0V	-	-	1.5	V

Notes:

1.Pulse width limited by safe operating area.

2.Starting Tj=25°C , V_{DD}=50V , L=25mH , R_G=25Ω , I_{AS}=4A.

3.Pulse width $\leq$300us , duty cycle $\leq$2%.

Ordering Information

SSM04N70BP, SSM04N70BR   BVD$_{SS}$ = 600V

SSM04N70BP-A, SSM04N70BP-A   BVD$_{SS}$ = 650V

SSM04N70BP-H, SSM04N70BP-H   BVD$_{SS}$ = 700V
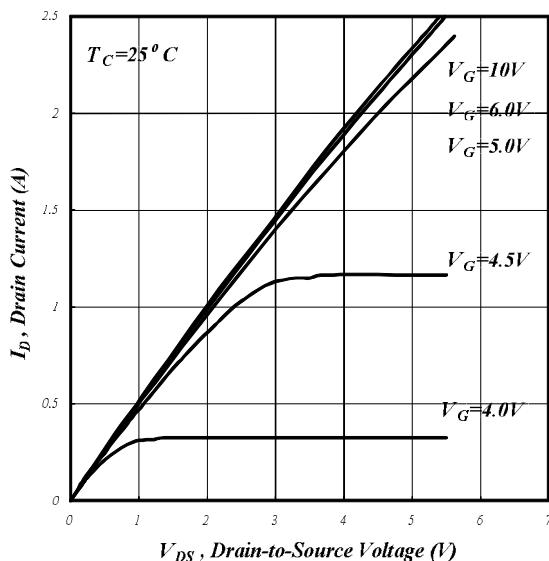
Fig 1. Typical Output Characteristics
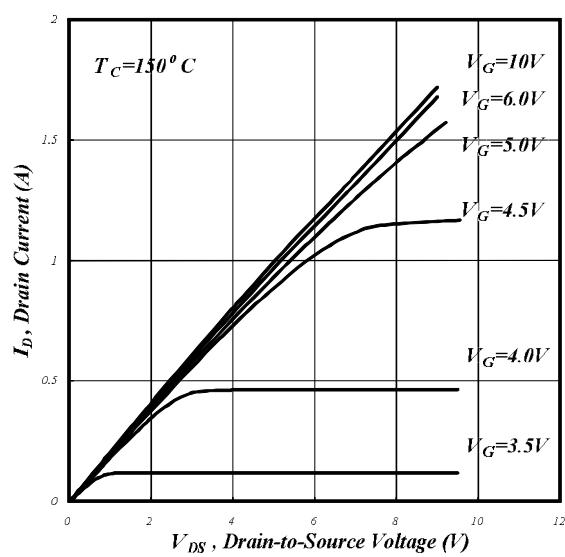

Fig 2. Typical Output Characteristics
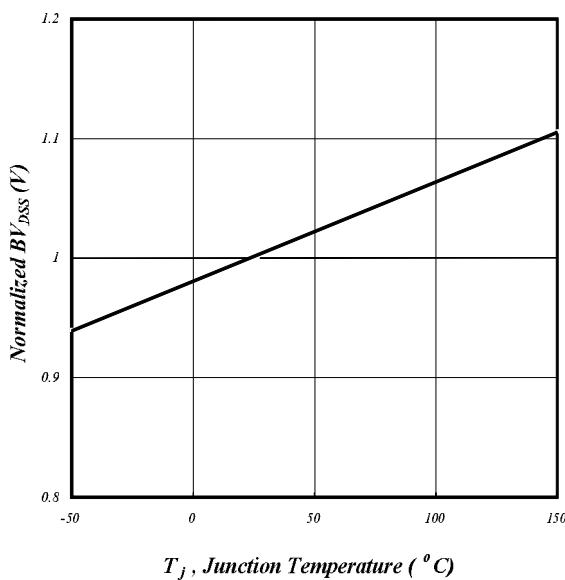
Fig 3. Normalized BV_{DSS} vs. Junction Temperature
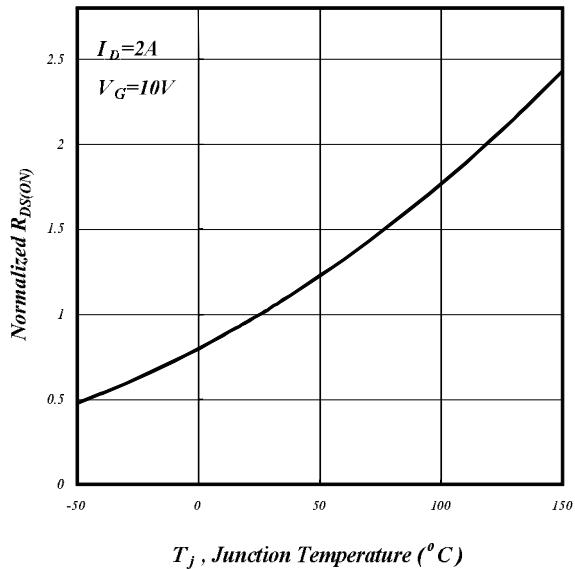
Fig 4. Normalized On-Resistance vs. Junction Temperature
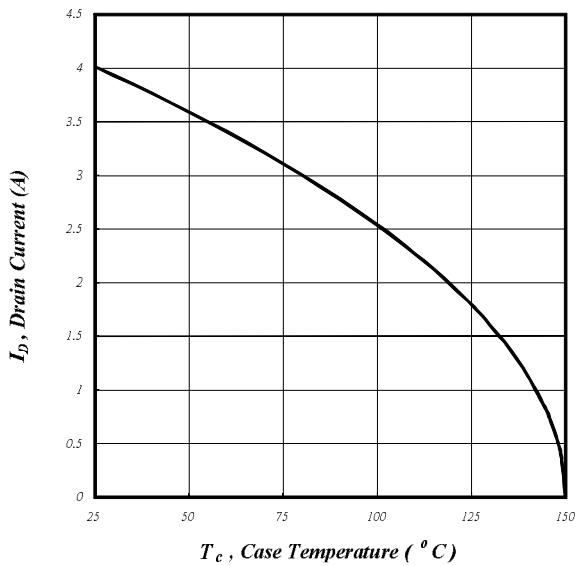
Fig 5. Maximum Drain Current vs.
Case Temperature
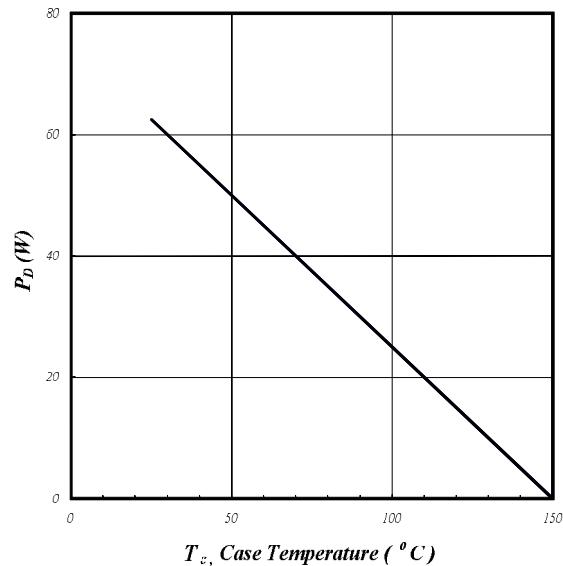

Fig 6. Typical Power Dissipation
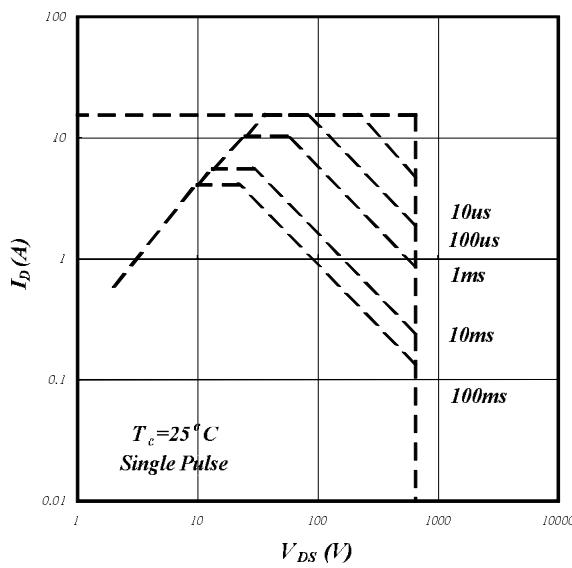

Fig 7. Maximum Safe Operating Area
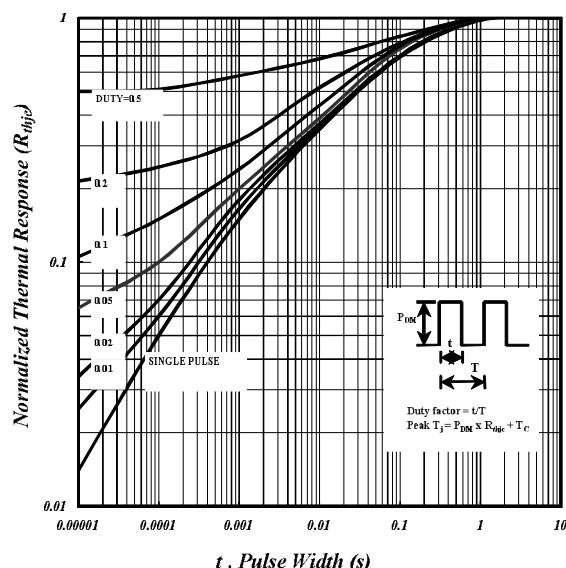

Fig 8. Effective Transient Thermal Impedance
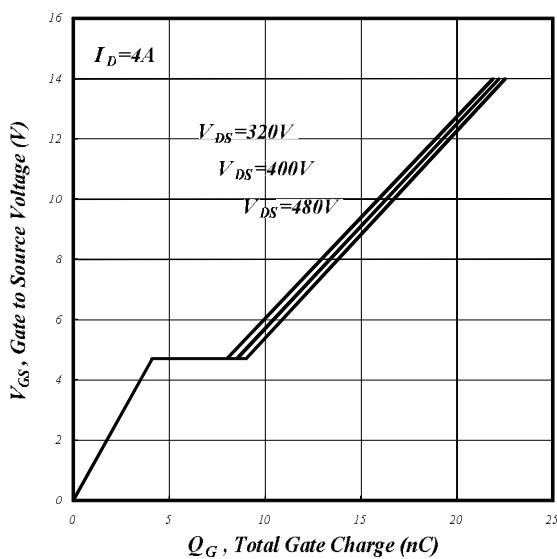
Fig 9. Gate Charge Characteristics
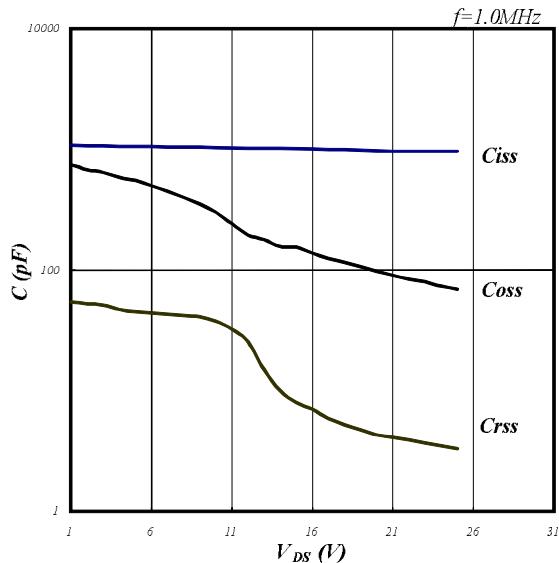
Fig 10. Typical Capacitance Characteristics
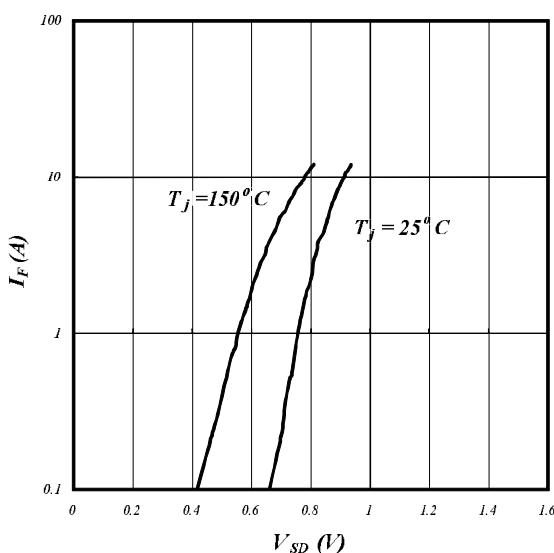
Fig 11. Forward Characteristic of
Reverse Diode
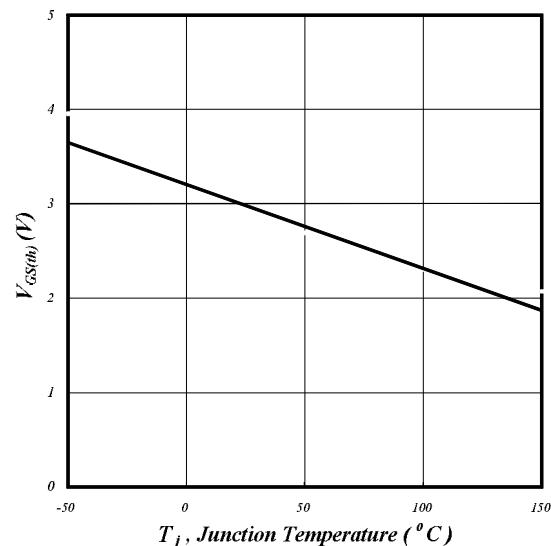
Fig 12. Gate Threshold Voltage vs.
Junction Temperature
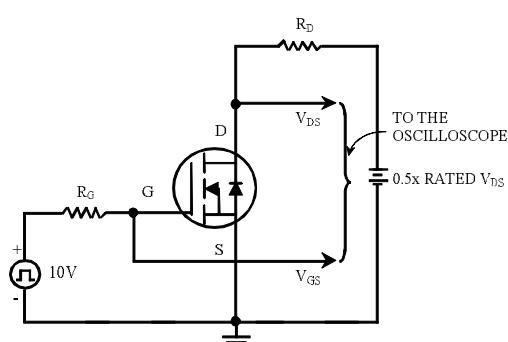
Fig 13. Switching Time Circuit
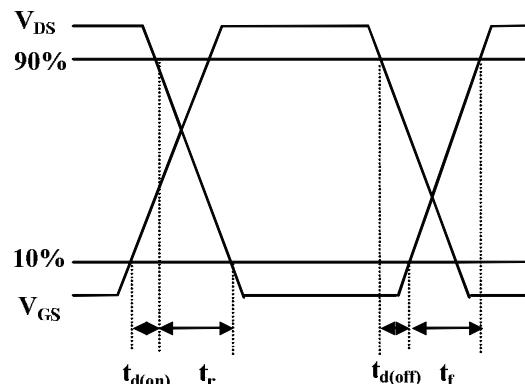
Fig 14. Switching Time Waveform
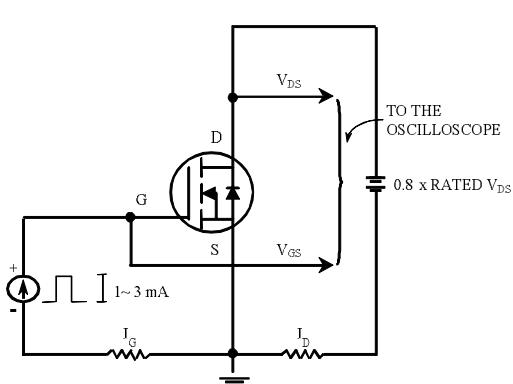
Fig 15. Gate Charge Circuit
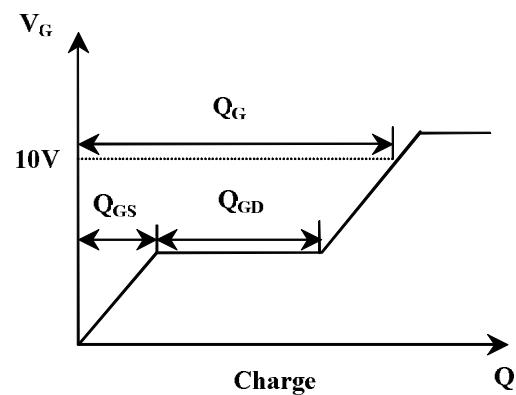
Fig 16. Gate Charge Waveform