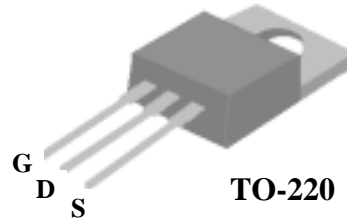


## N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

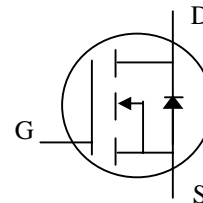
Repetitive-avalanche rated  
Fast-switching  
Simple drive requirement



$BV_{DSS}$  600V  
 $R_{DS(ON)}$  8Ω  
 $I_D$  2A

### Description

The TO-220 package is widely preferred for commercial and industrial applications. The SSM02N60P is well suited for DC/DC and AC/DC converters in telecom, industrial and consumer applications.



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	600	V
$V_{GS}$	Gate-Source Voltage	± 20	V
$I_D @ T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	2	A
$I_D @ T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	1.26	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	6	A
$P_D @ T_C=25^\circ\text{C}$	Total Power Dissipation	39	W
	Linear Derating Factor	0.31	W/°C
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	130	mJ
$I_{AR}$	Avalanche Current	2	A
$E_{AR}$	Repetitive Avalanche Energy	2	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. 3.2	°C/W
Rthj-a	Thermal Resistance Junction-ambient	Max. 62	°C/W

**Electrical Characteristics @  $T_j=25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	600	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	-	0.6	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=1A$	-	-	8	$\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
$g_{fs}$	Forward Transconductance	$V_{DS}=20V, I_D=1A$	-	0.2	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{DS}=600V, V_{GS}=0V$	-	-	10	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{DS}=480V, V_{GS}=0V$	-	-	100	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>3</sup>	$I_D=2A$	-	14	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=480V$	-	2	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=10V$	-	8.5	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>3</sup>	$V_{DD}=300V$	-	9.5	-	ns
$t_r$	Rise Time	$I_D=2A$	-	12	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=10\Omega, V_{GS}=10V$	-	21	-	ns
$t_f$	Fall Time	$R_D=150\Omega$	-	9	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	155	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	-	27	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	14	-	pF

**Source-Drain Diode**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.5V$	-	-	2	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	6	A
$V_{SD}$	Forward On Voltage <sup>3</sup>	$T_j=25^\circ\text{C}, I_S=2A, V_{GS}=0V$	-	-	1.5	V

**Notes:**

1. Pulse width limited by safe operating area.
2. Starting  $T_j=25^\circ\text{C}$ ,  $V_{DD}=50V$ ,  $L=60\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=2A$ .
3. Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

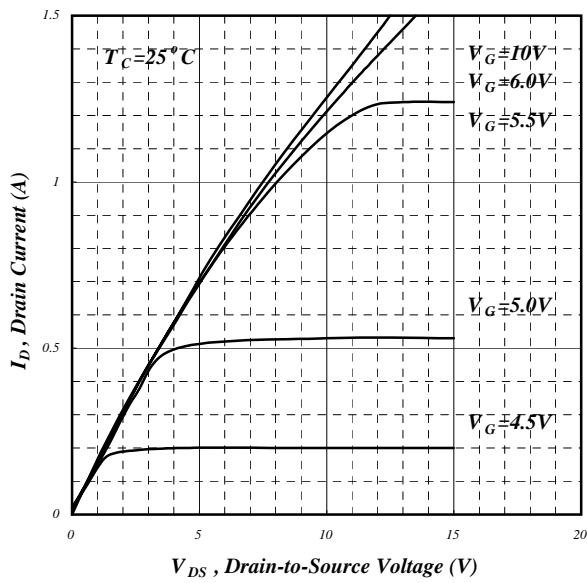


Fig 1. Typical Output Characteristics

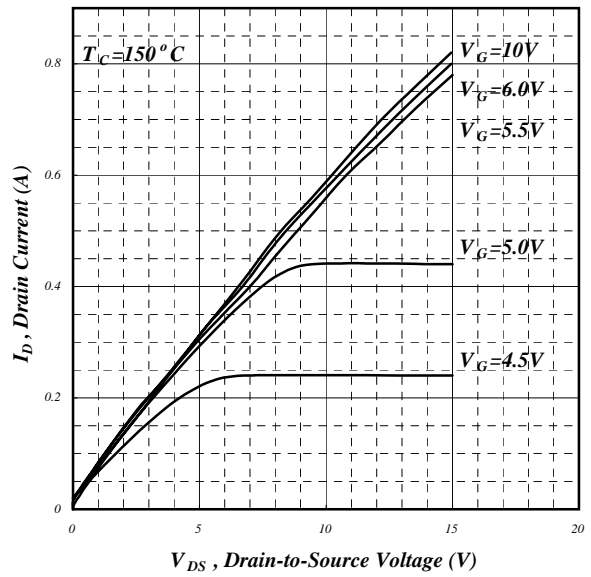


Fig 2. Typical Output Characteristics

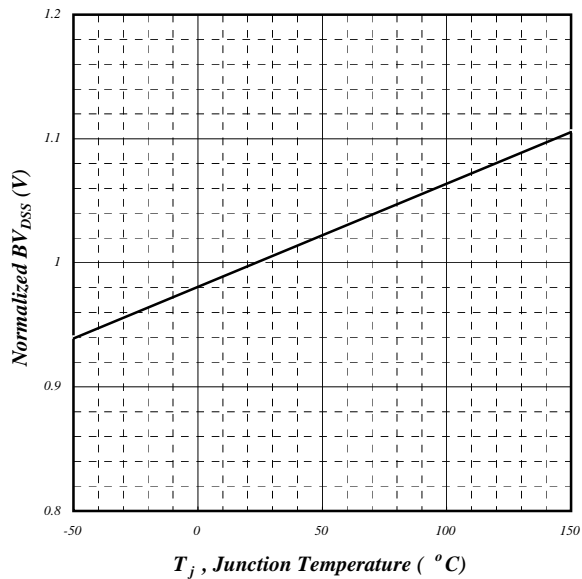


Fig 3. Normalized  $BV_{DSS}$  vs. Junction Temperature

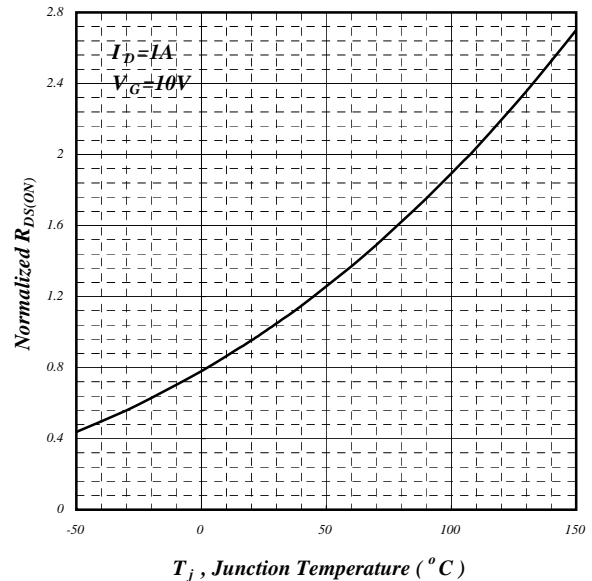
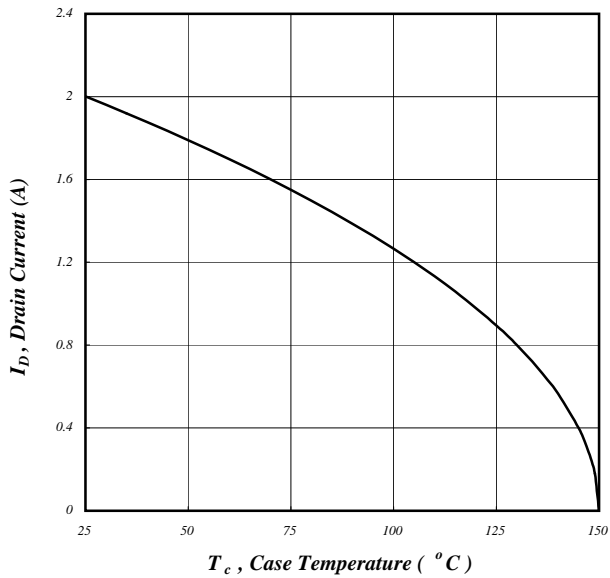
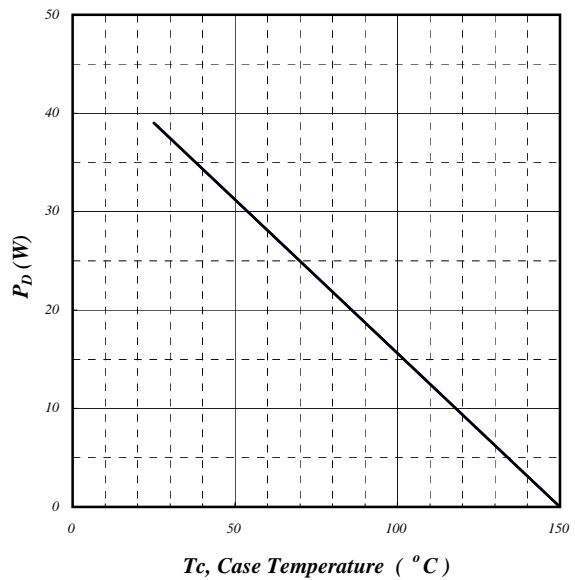


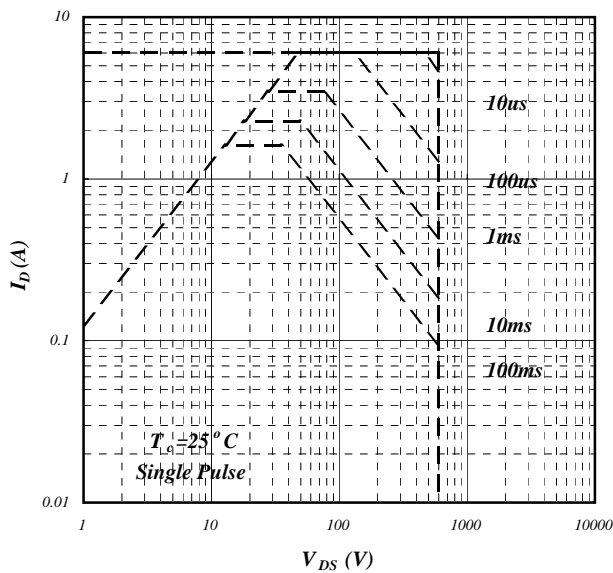
Fig 4. Normalized On-Resistance vs. Junction Temperature



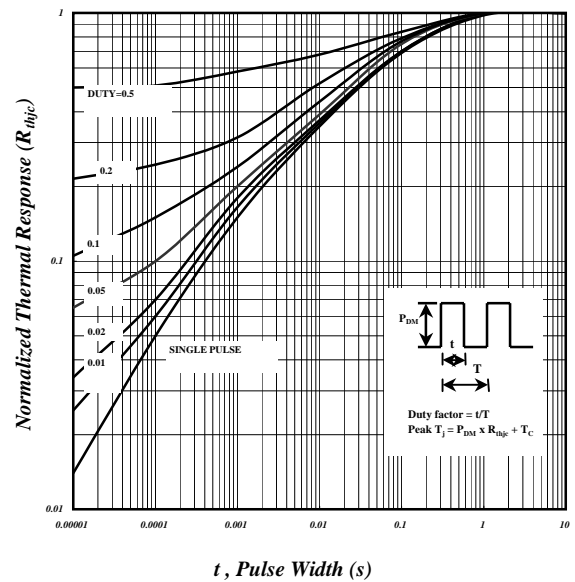
**Fig 5. Maximum Drain Current v.s. Case Temperature**



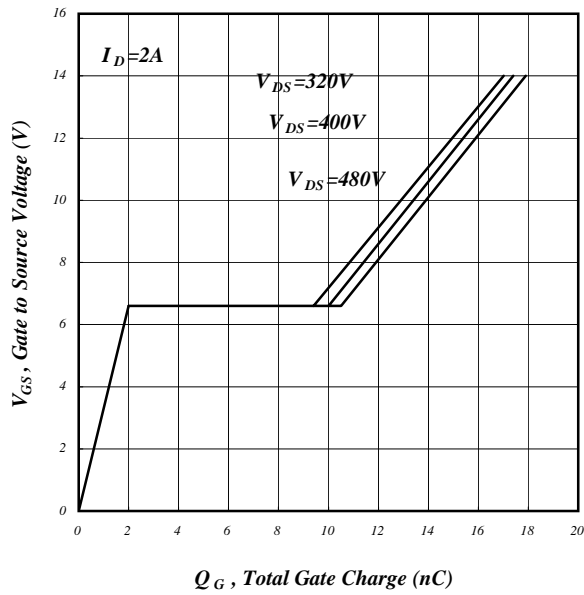
**Fig 6. Typical Power Dissipation**



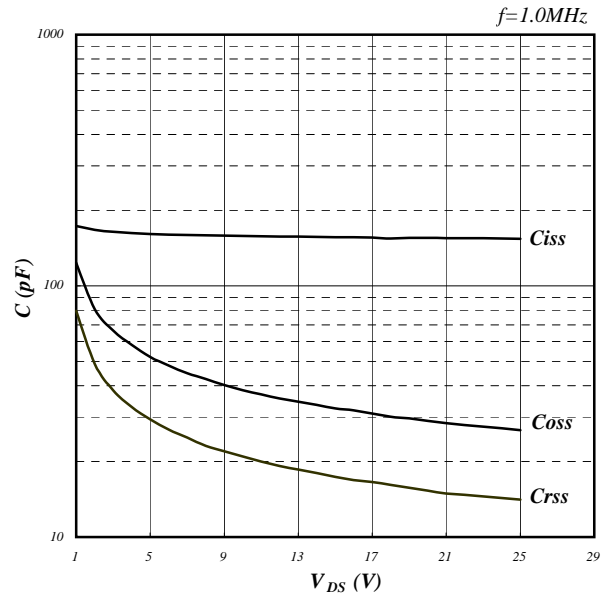
**Fig 7. Maximum Safe Operating Area**



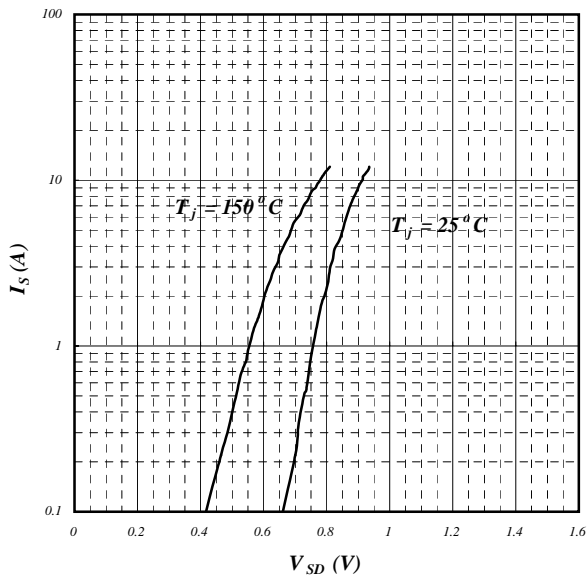
**Fig 8. Effective Transient Thermal Impedance**



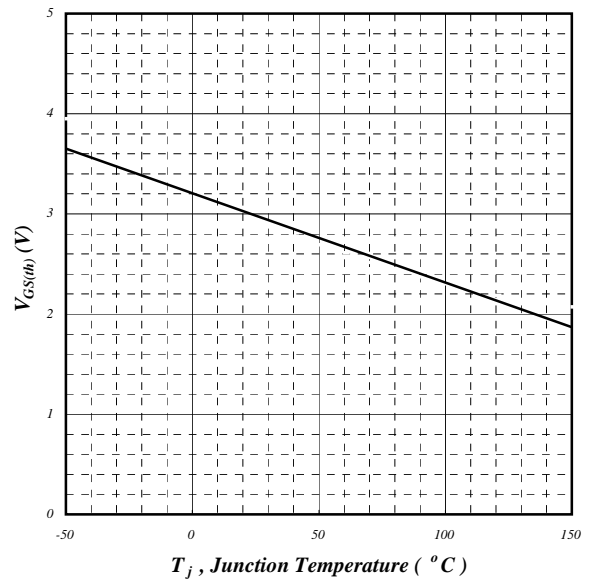
**Fig 9. Gate Charge Characteristics**



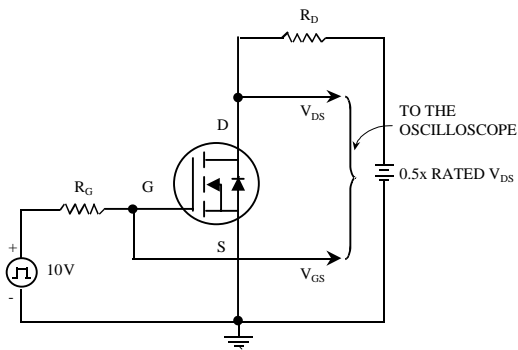
**Fig 10. Typical Capacitance Characteristics**



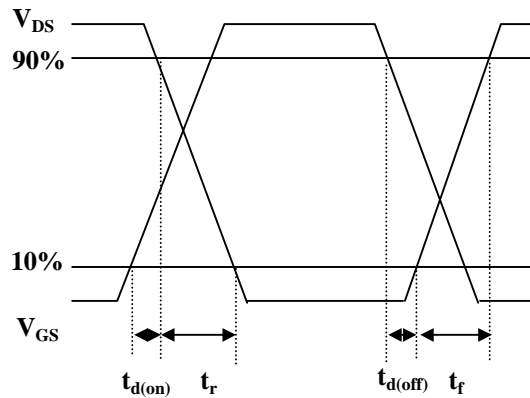
**Fig 11. Forward Characteristic of Reverse Diode**



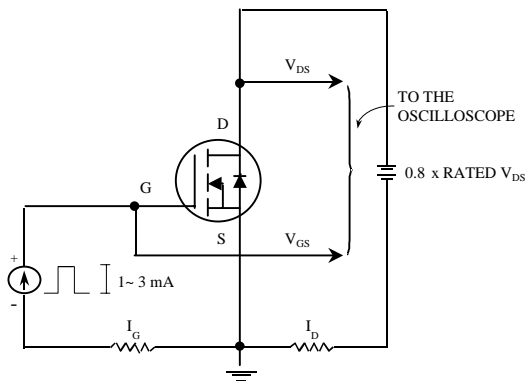
**Fig 12. Gate Threshold Voltage vs. Junction Temperature**



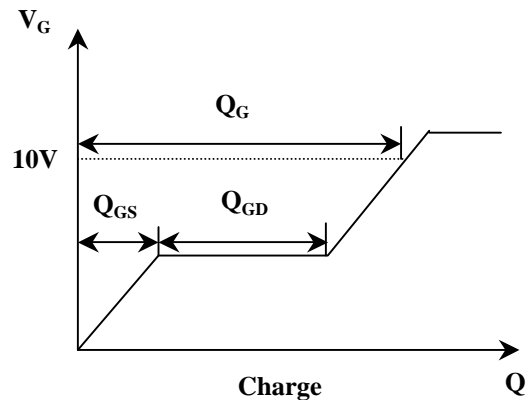
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

Information furnished by Silicon Standard Corporation is believed to be accurate and reliable. However, Silicon Standard Corporation makes no guarantee or warranty, express or implied, as to the reliability, accuracy, timeliness or completeness of such information and assumes no responsibility for its use, or for infringement of any patent or other intellectual property rights of third parties that may result from its use. Silicon Standard reserves the right to make changes as it deems necessary to any products described herein for any reason, including without limitation enhancement in reliability, functionality or design. No license is granted, whether expressly or by implication, in relation to the use of any products described herein or to the use of any information provided herein, under any patent or other intellectual property rights of Silicon Standard Corporation or any third parties.