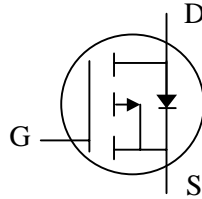


## P-CHANNEL ENHANCEMENT-MODE POWER MOSFET

- Simple drive requirement
- 2.5V gate drive capability
- Fast switching

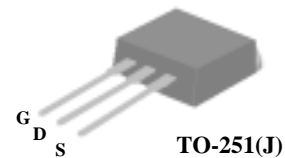
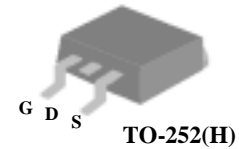


$BV_{DSS}$	-20V
$R_{DS(ON)}$	52m $\Omega$
$I_D$	-18A

### Description

Power MOSFETs from Silicon Standard provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-252 package is widely preferred for all commercial and industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (SSM20P02J) is available for low-profile applications.



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	- 20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D @ T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	-18	A
$I_D @ T_A=100^\circ\text{C}$	Continuous Drain Current, $V_{GS}$ @ 10V	-14	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	-50	A
$P_D @ T_A=25^\circ\text{C}$	Total Power Dissipation	31.25	W
	Linear Derating Factor	0.25	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Thermal Resistance Junction-case	Max. 4.0	$^\circ\text{C}/\text{W}$
Rthj-a	Thermal Resistance Junction-ambient	Max. 110	$^\circ\text{C}/\text{W}$

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

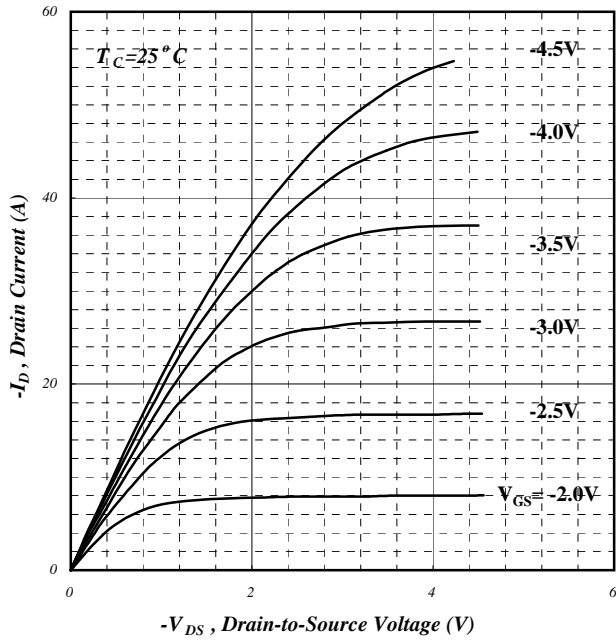
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	-	-0.03	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-8A$	-	-	52	$\text{m}\Omega$
		$V_{GS}=-2.5V, I_D=-5A$	-	-	85	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.5	-	-	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-8A$	-	15	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{DS}=-20V, V_{GS}=0V$	-	-	-1	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{DS}=-16V, V_{GS}=0V$	-	-	-25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 12$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=-8A$	-	13.5	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=-16V$	-	2.1	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	1.6	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=-10V$	-	12	-	ns
$t_r$	Rise Time	$I_D=-8A$	-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=-4.5V$	-	45	-	ns
$t_f$	Fall Time	$R_D=1.25\Omega$	-	27	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	1050	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=-16V$	-	410	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	110	-	pF

**Source-Drain Diode**

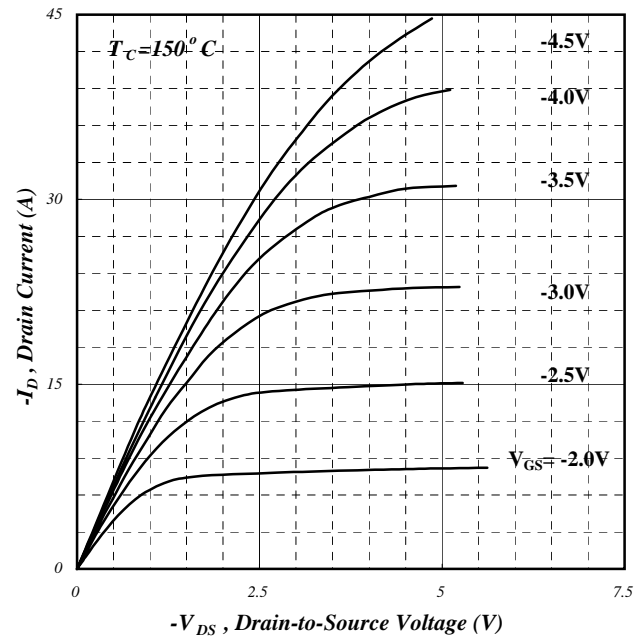
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=-1.2V$	-	-	-10	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	-50	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=-10A, V_{GS}=0V$	-	-	-1.2	V

**Notes:**

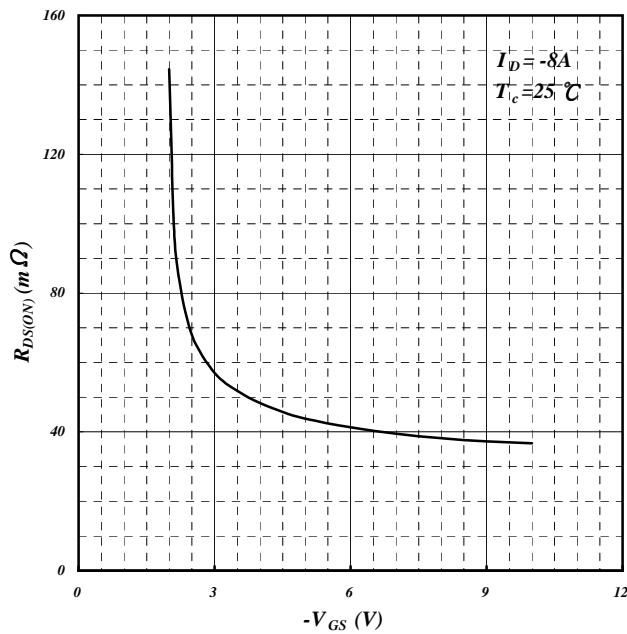
- 1.Pulse width limited by safe operating area.
- 2.Pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .



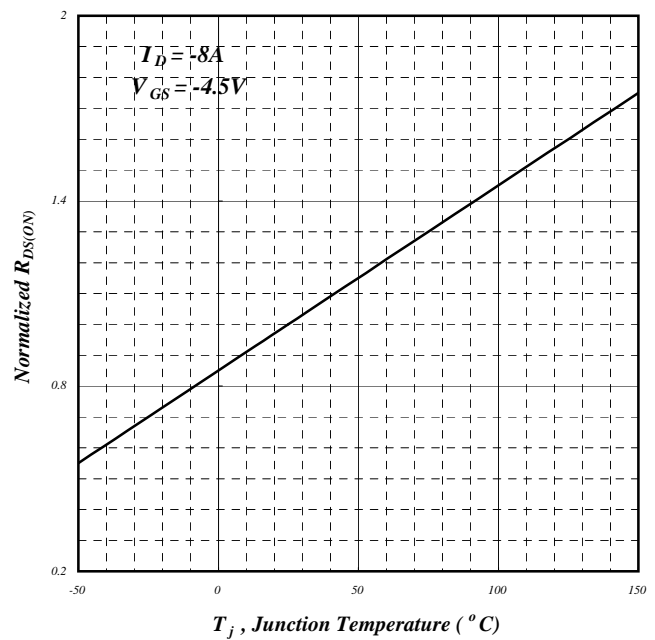
**Fig 1. Typical Output Characteristics**



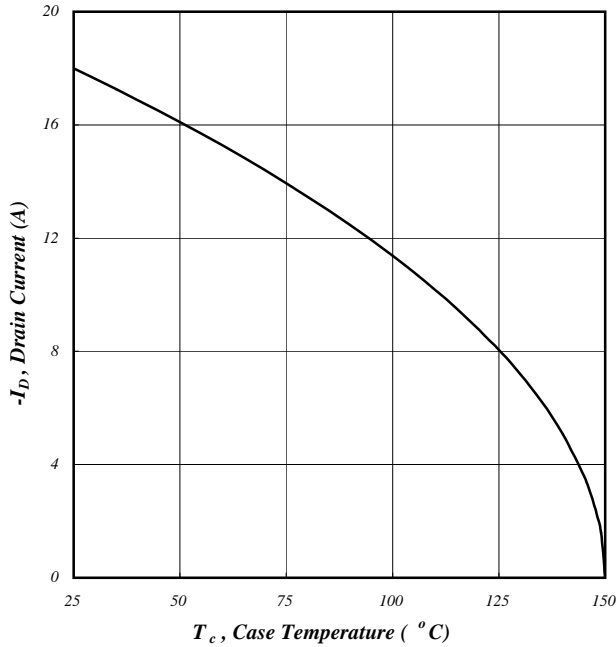
**Fig 2. Typical Output Characteristics**



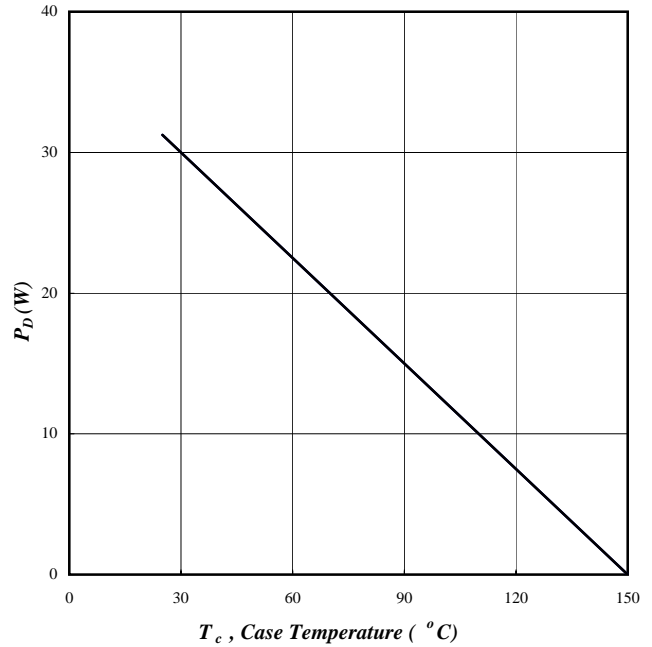
**Fig 3. On-Resistance v.s. Gate Voltage**



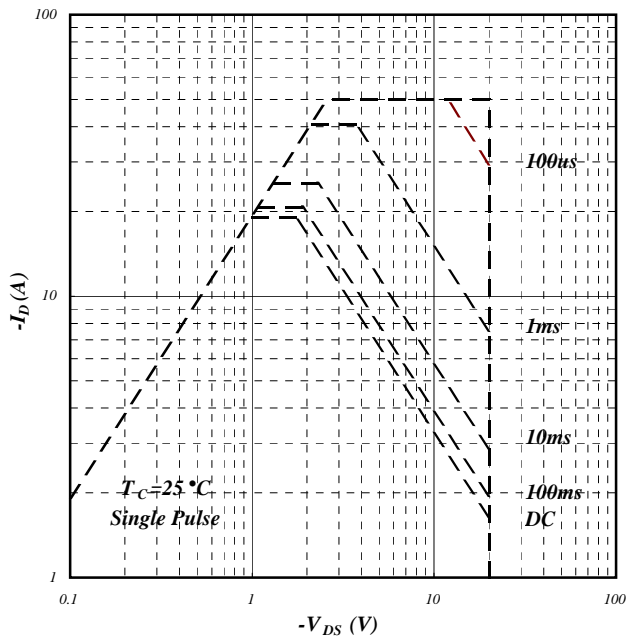
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



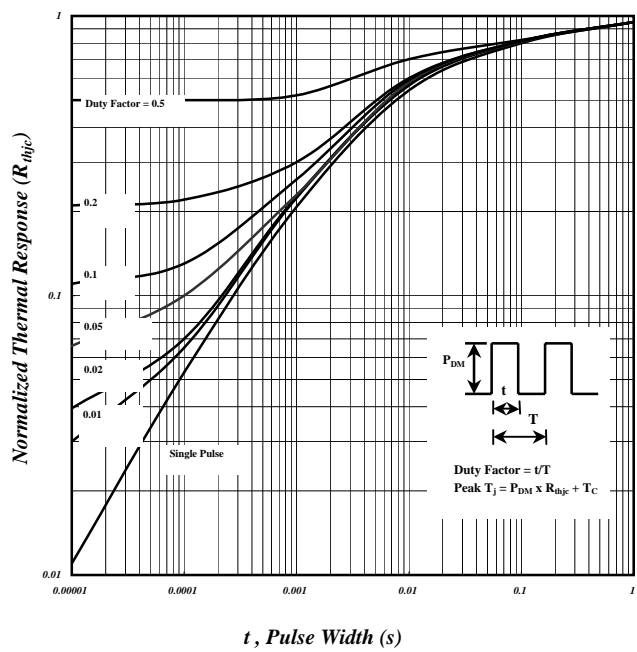
**Fig 5. Maximum Drain Current v.s. Case Temperature**



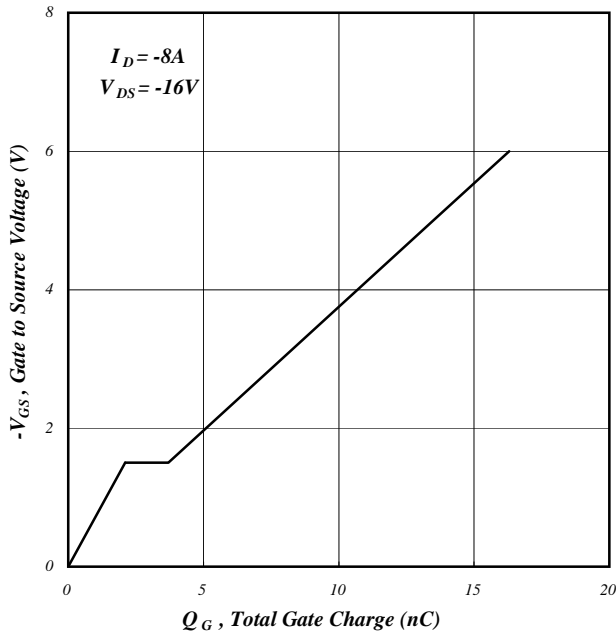
**Fig 6. Typical Power Dissipation**



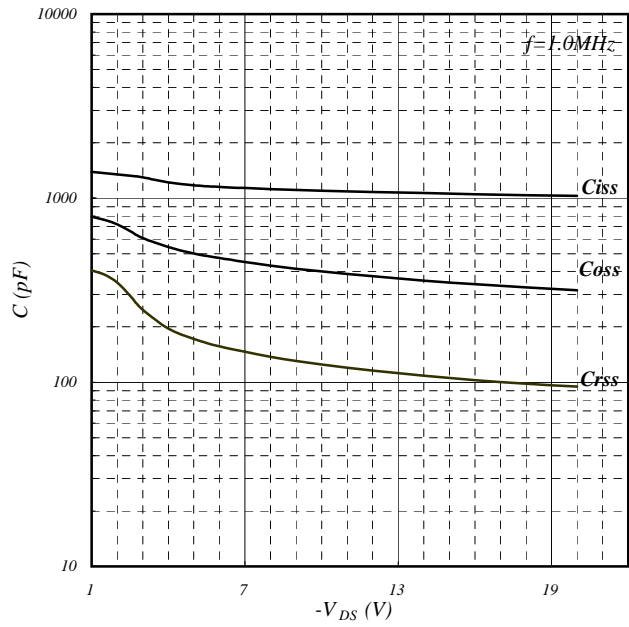
**Fig 7. Maximum Safe Operating Area**



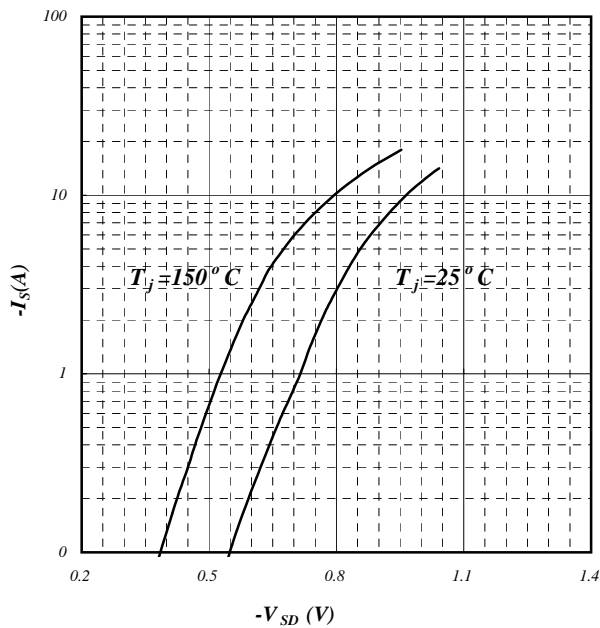
**Fig 8. Effective Transient Thermal Impedance**



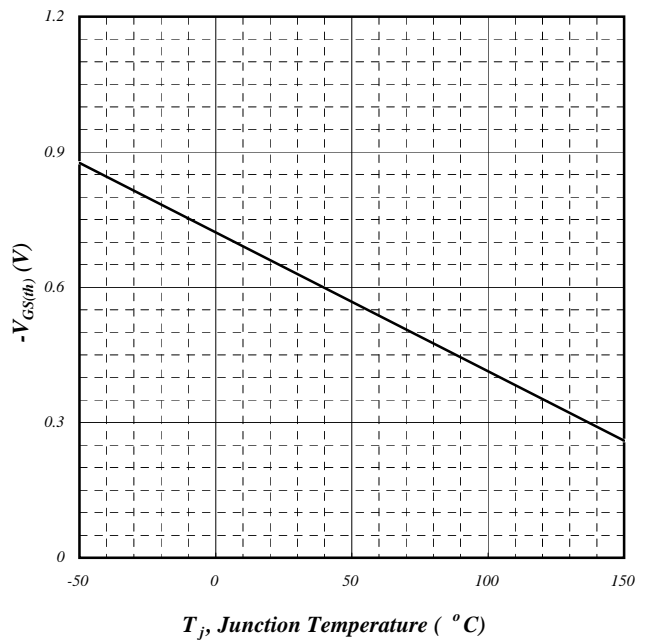
**Fig 9. Gate Charge Characteristics**



**Fig 10. Typical Capacitance Characteristics**



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



**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**

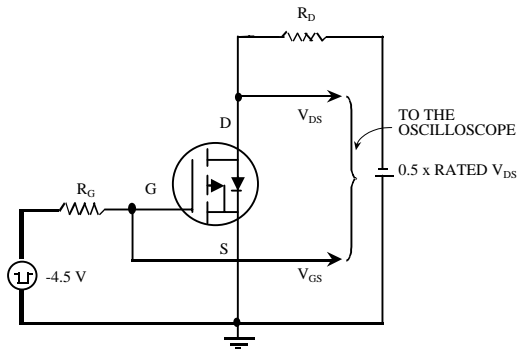


Fig 13. Switching Time Circuit

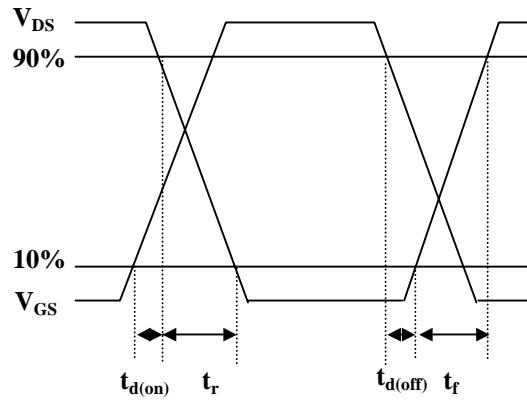


Fig 14. Switching Time Waveform

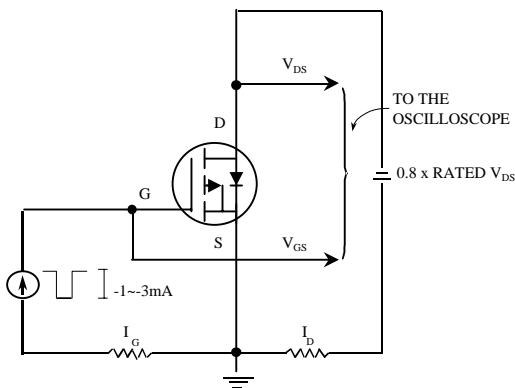


Fig 15. Gate Charge Circuit

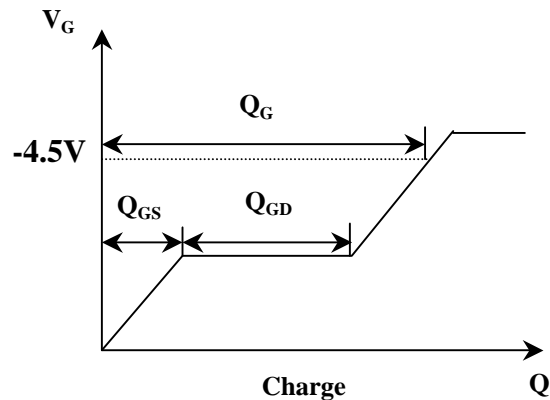


Fig 16. Gate Charge Waveform

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