

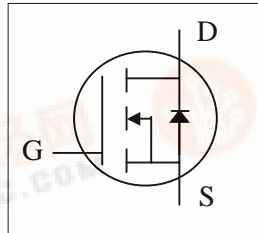
## AP60L02S/P



**Advanced Power  
Electronics Corp.**

*N-CHANNEL ENHANCEMENT MODE  
POWER MOSFET*

- ▼ Low Gate Charge
- ▼ Simple Drive Requirement
- ▼ Fast Switching

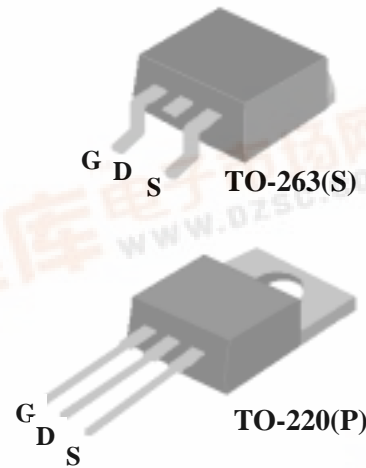


$BV_{DSS}$	25V
$R_{DS(ON)}$	12m $\Omega$
$I_D$	50A

### Description

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

The TO-263 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (AP60L02P) is available for low-profile applications.



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	25	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	50	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	32	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	180	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation	62.5	W
	Linear Derating Factor	0.5	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Value	Unit
Rthj-case	Thermal Resistance Junction-case	Max. 2.0	$^\circ C/W$
Rthj-amb	Thermal Resistance Junction-ambient	Max. 62	$^\circ C/W$



## AP60L02S/P

### 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	$V_{GS}=0V, I_D=250\mu A$	25	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}\text{C}, I_D=1\text{mA}$	-	0.037	-	$V/^{\circ}\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=25A$	-	-	12	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=20A$	-	-	26	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=25A$	-	30	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^{\circ}\text{C}$ )	$V_{DS}=25V, V_{GS}=0V$	-	-	1	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^{\circ}\text{C}$ )	$V_{DS}=20V, V_{GS}=0V$	-	-	25	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=25A$	-	21	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=20V$	-	2.8	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=5V$	-	16	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=15V$	-	8	-	ns
$t_r$	Rise Time	$I_D=20A$	-	75	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	22	-	ns
$t_f$	Fall Time	$R_D=0.75\Omega$	-	20	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	605	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	-	415	-	pF
$C_{riss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	195	-	pF

### Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.26V$	-	-	50	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	180	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^{\circ}\text{C}, I_S=50A, V_{GS}=0V$	-	-	1.26	V

#### Notes:

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



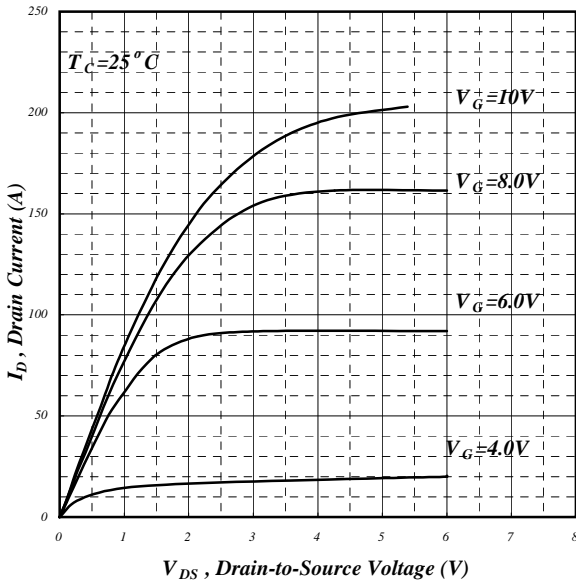


Fig 1. Typical Output Characteristics

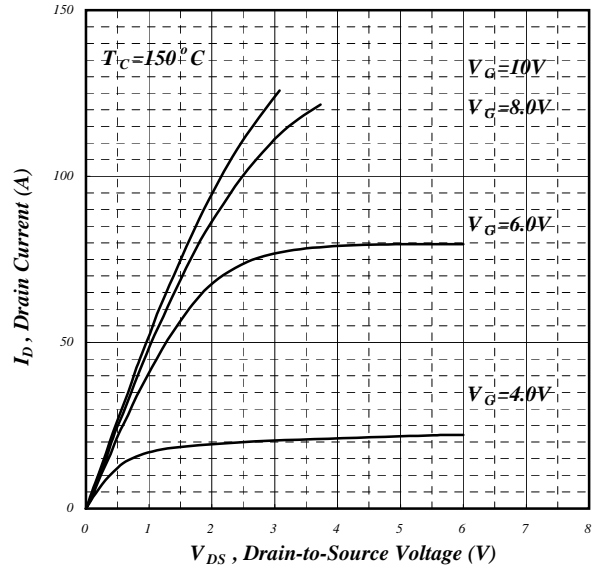


Fig 2. Typical Output Characteristics

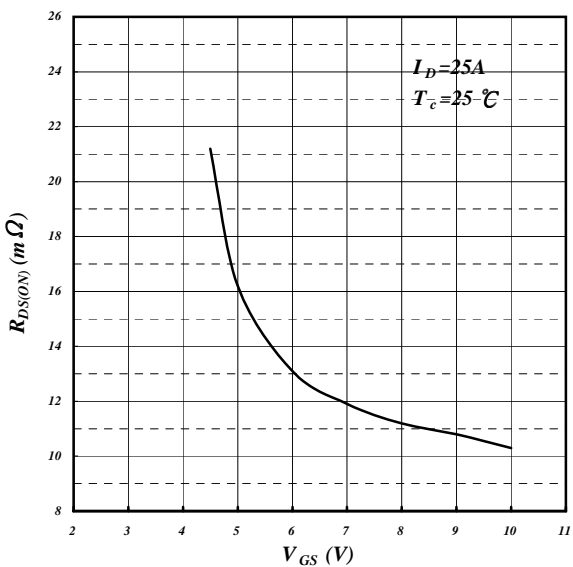


Fig 3. On-Resistance v.s. Gate Voltage

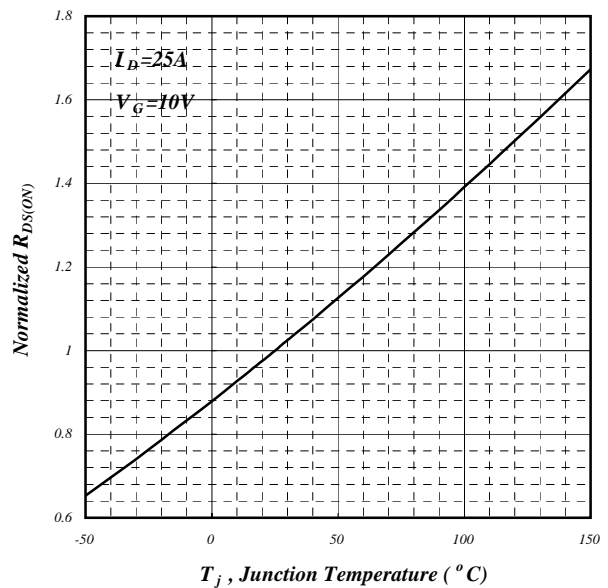


Fig 4. Normalized On-Resistance v.s. Junction Temperature



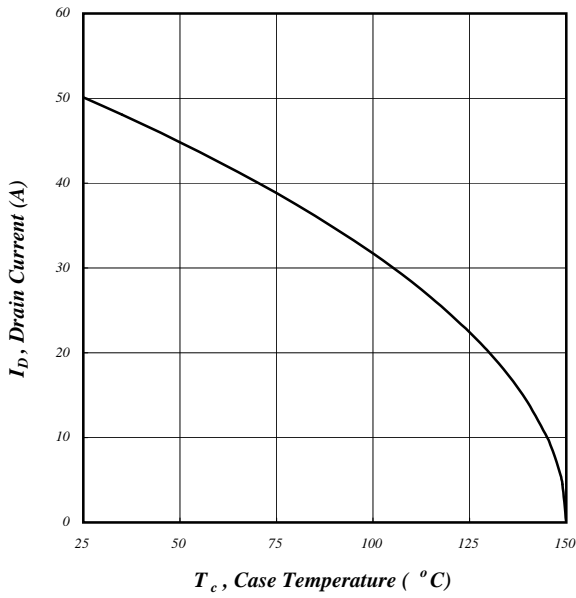


Fig 5. Maximum Drain Current v.s. Case Temperature

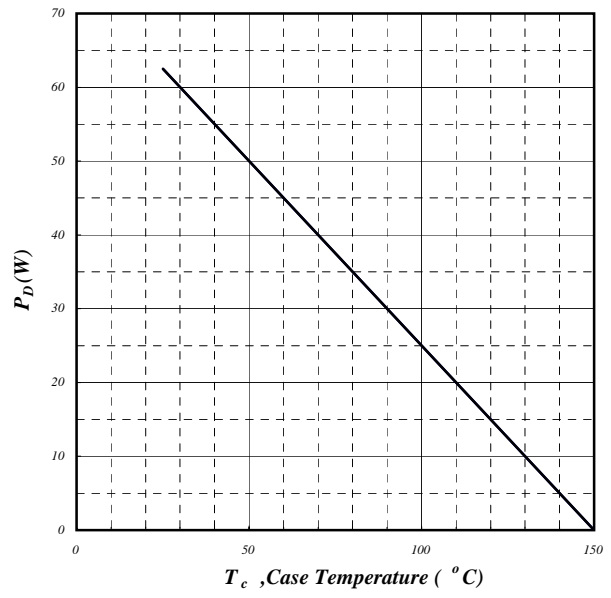


Fig 6. Typical Power Dissipation

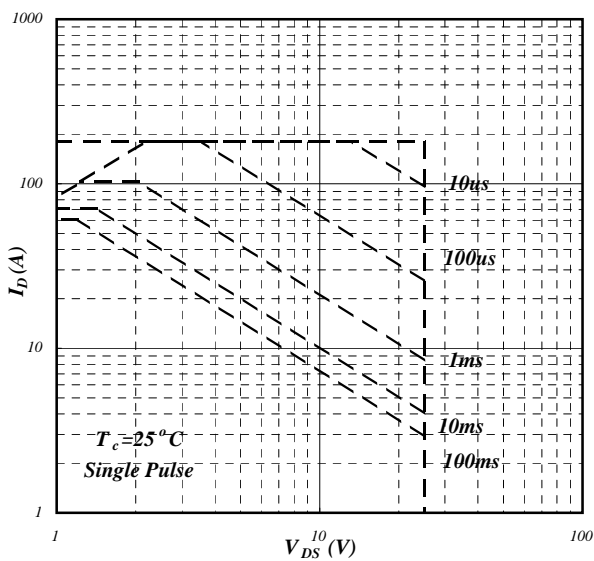


Fig 7. Maximum Safe Operating Area

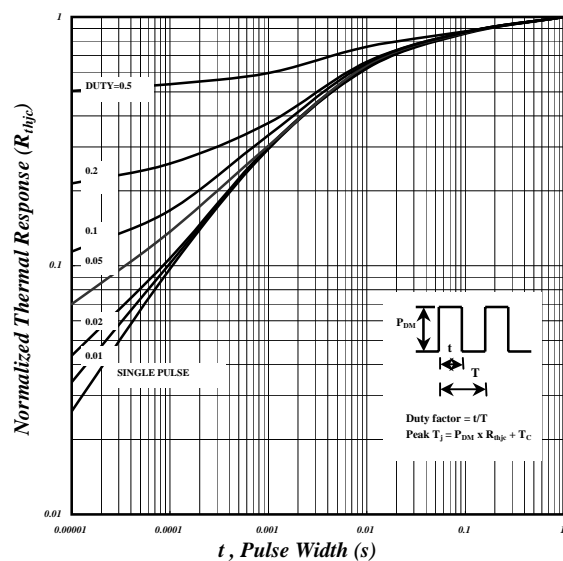


Fig 8. Effective Transient Thermal Impedance



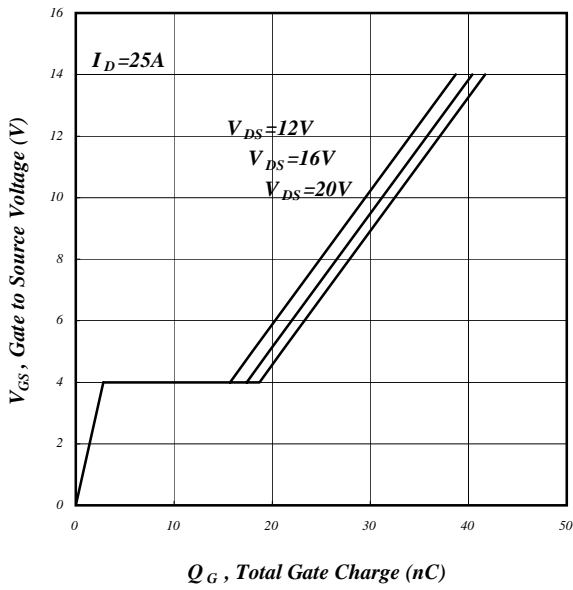


Fig 9. Gate Charge Characteristics

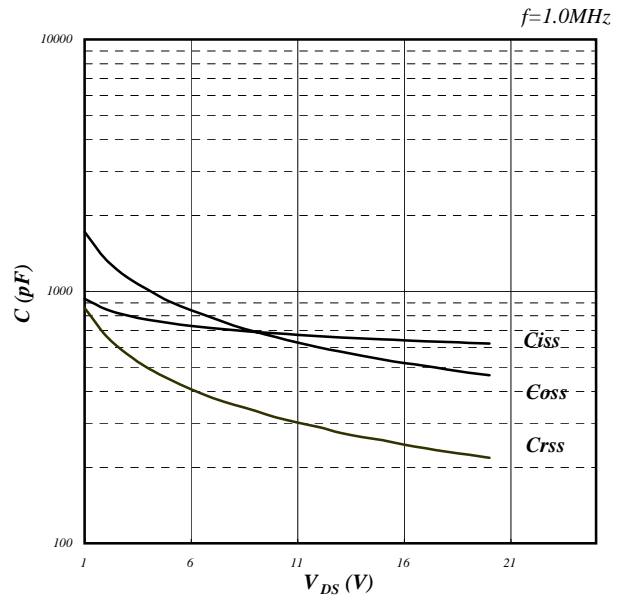


Fig 10. Typical Capacitance Characteristics

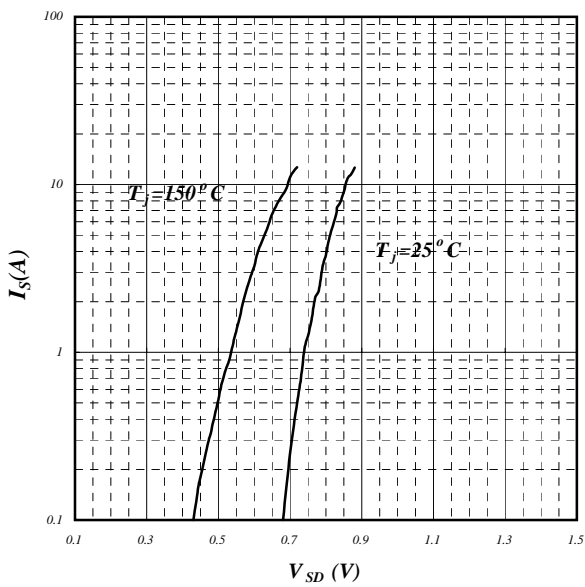


Fig 11. Forward Characteristic of Reverse Diode

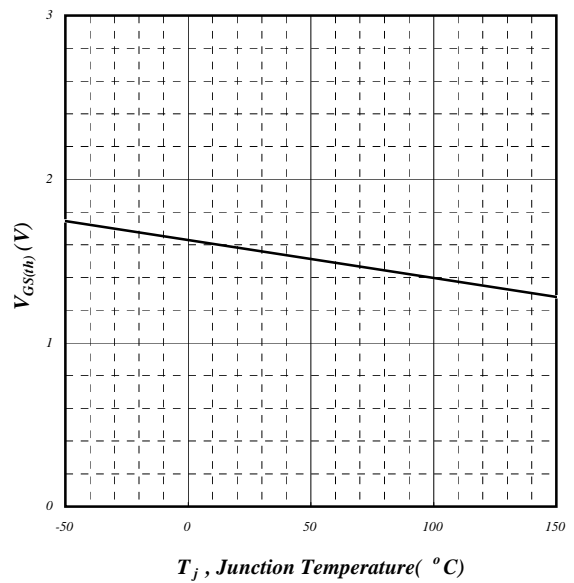


Fig 12. Gate Threshold Voltage v.s. Junction Temperature



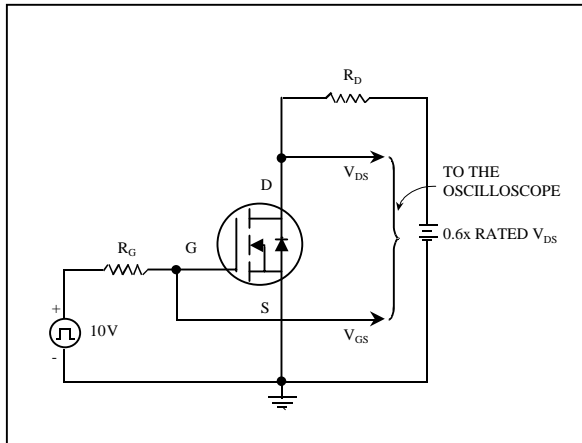


Fig 13. Switching Time Circuit

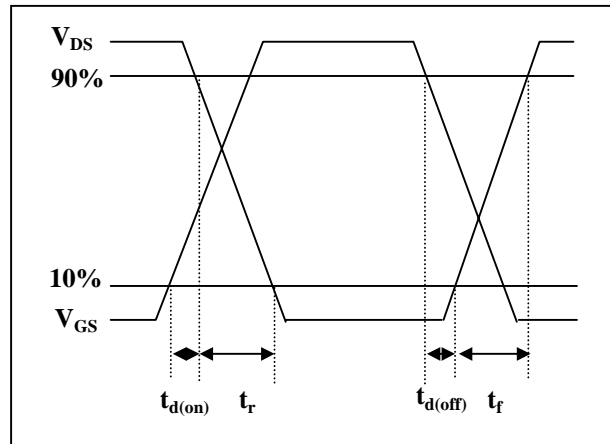


Fig 14. Switching Time Waveform

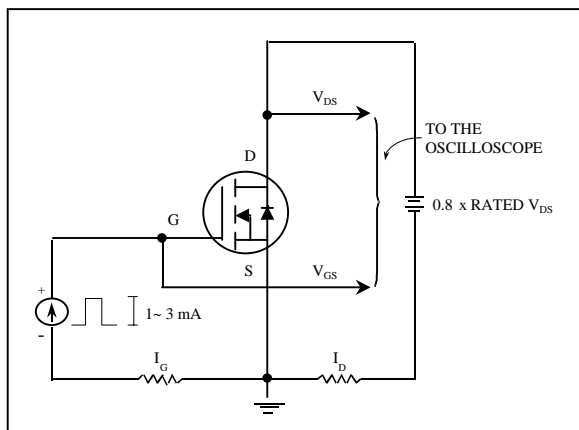


Fig 15. Gate Charge Circuit

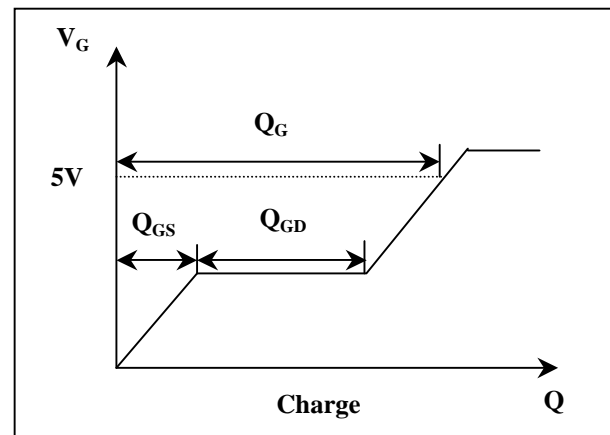


Fig 16. Gate Charge Waveform

