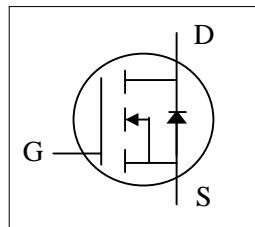




- ▼ Simple Drive Requirement
- ▼ Low Gate Charge
- ▼ Fast Switching

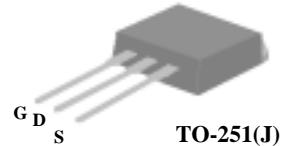
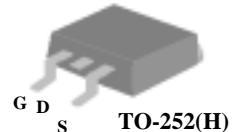


$BV_{DSS}$	40V
$R_{DS(ON)}$	16mΩ
$I_D$	42A

## 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-252 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 (AP9960GJ) are available for low-profile applications.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	42	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	26	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	195	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	45	W
	Linear Derating Factor	0.36	W/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Value	Units
$R_{thj-c}$	Thermal Resistance Junction-case	Max. 2.8	°C/W
$R_{thj-a}$	Thermal Resistance Junction-ambient	Max. 110	°C/W



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

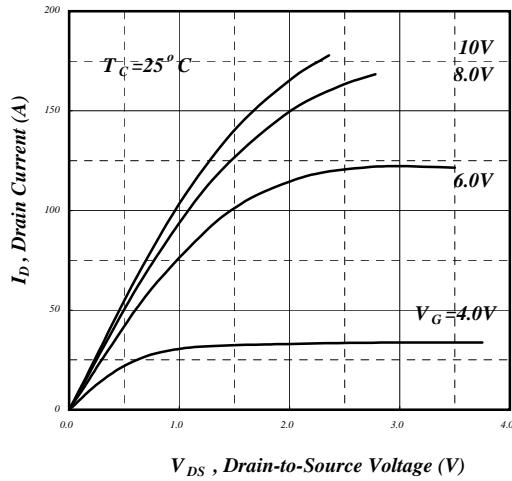
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$\text{BV}_{\text{DSS}}$	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$	40	-	-	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_{\text{D}}=1\text{mA}$	-	0.032	-	$\text{V}/^\circ\text{C}$
$R_{\text{DS}(\text{ON})}$	Static Drain-Source On-Resistance	$V_{\text{GS}}=10\text{V}, I_{\text{D}}=20\text{A}$	-	-	16	$\text{m}\Omega$
		$V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=18\text{A}$	-	-	25	$\text{m}\Omega$
$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$	1	-	3	V
$g_{\text{fs}}$	Forward Transconductance	$V_{\text{DS}}=10\text{V}, I_{\text{D}}=20\text{A}$	-	30	-	S
$I_{\text{DSS}}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{\text{DS}}=40\text{V}, V_{\text{GS}}=0\text{V}$	-	-	1	$\mu\text{A}$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{\text{DS}}=32\text{V}, V_{\text{GS}}=0\text{V}$	-	-	25	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-Source Leakage	$V_{\text{GS}}= \pm 20\text{V}$	-	-	$\pm 100$	$\text{nA}$
$Q_g$	Total Gate Charge <sup>2</sup>	$I_{\text{D}}=20\text{A}$	-	18	-	nC
$Q_{\text{gs}}$	Gate-Source Charge	$V_{\text{DS}}=20\text{V}$	-	6	-	nC
$Q_{\text{gd}}$	Gate-Drain ("Miller") Charge	$V_{\text{GS}}=4.5\text{V}$	-	12	-	nC
$t_{\text{d}(\text{on})}$	Turn-on Delay Time <sup>2</sup>	$V_{\text{DS}}=20\text{V}$	-	9	-	ns
$t_r$	Rise Time	$I_{\text{D}}=20\text{A}$	-	110	-	ns
$t_{\text{d}(\text{off})}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{\text{GS}}=10\text{V}$	-	23	-	ns
$t_f$	Fall Time	$R_{\text{D}}=1\Omega$	-	10	-	ns
$C_{\text{iss}}$	Input Capacitance	$V_{\text{GS}}=0\text{V}$	-	1500	-	pF
$C_{\text{oss}}$	Output Capacitance	$V_{\text{DS}}=25\text{V}$	-	250	-	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance	f=1.0MHz	-	180	-	pF

### Source-Drain Diode

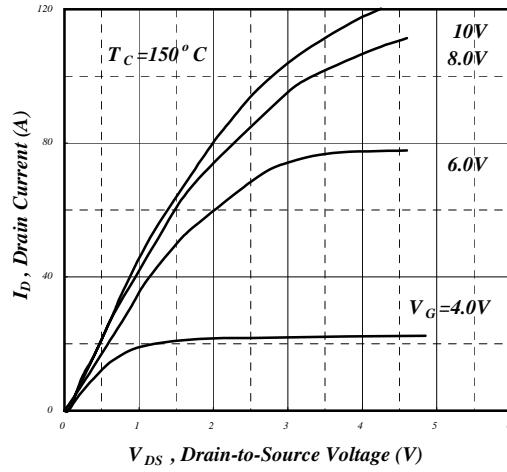
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{\text{SD}}$	Forward On Voltage <sup>2</sup>	$I_{\text{S}}=45\text{A}, V_{\text{GS}}=0\text{V}$	-	-	1.3	V
$t_{\text{rr}}$	Reverse Recovery Time	$I_{\text{S}}=20\text{A}, V_{\text{GS}}=0\text{V}$	-	22	-	ns
$Q_{\text{rr}}$	Reverse Recovery Charge	$dI/dt = 100\text{A}/\mu\text{s}$	-	27.4	-	nC

### Notes:

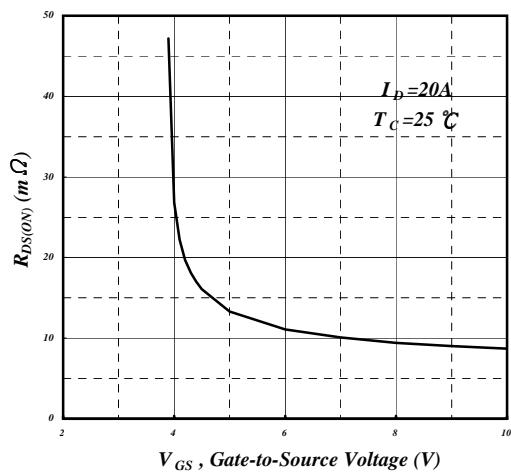
- 1.Pulse width limited by safe operating area.
- 2.Pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$ .



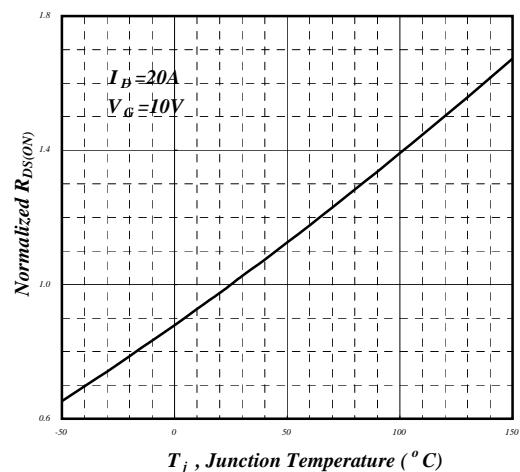
**Fig 1. Typical Output Characteristics**



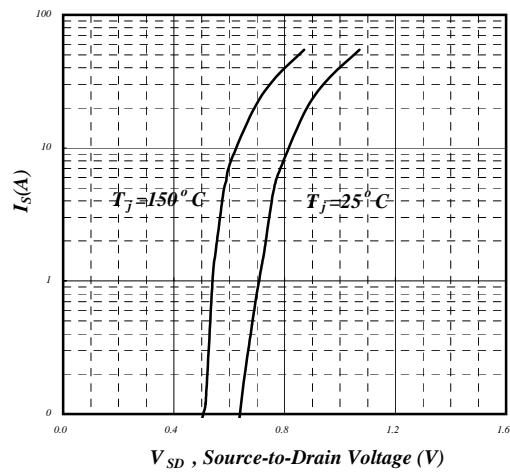
**Fig 2. Typical Output Characteristics**



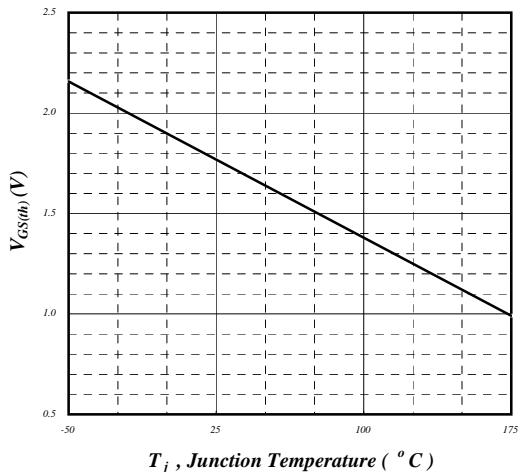
**Fig 3. On-Resistance v.s. Gate Voltage**



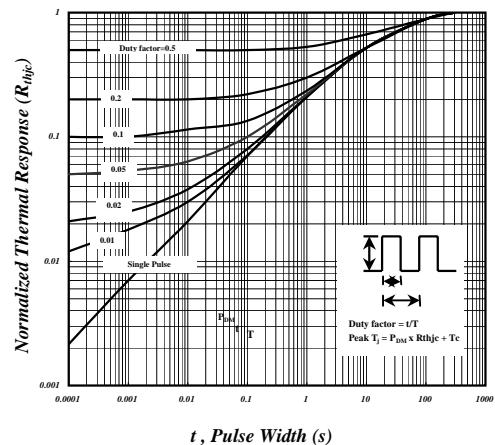
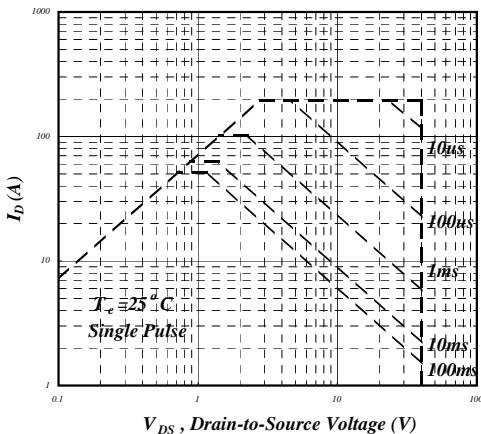
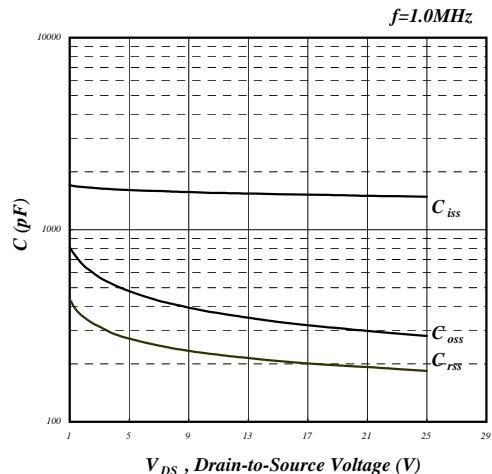
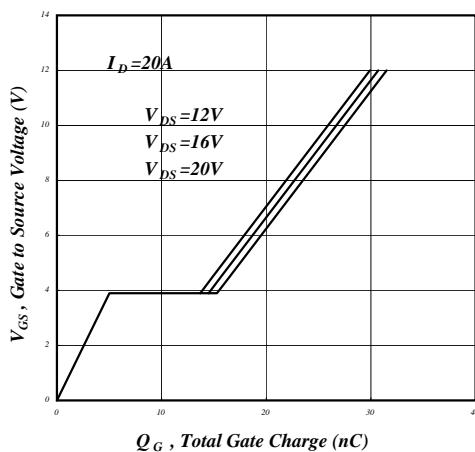
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



**Fig 5. Forward Characteristic of Reverse Diode**



**Fig 6. Gate Threshold Voltage v.s. Junction Temperature**



**Fig 9. Maximum Safe Operating Area**

**Fig 10. Effective Transient Thermal Impedance**

