

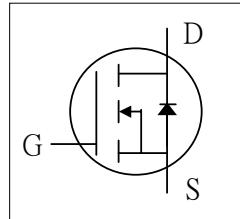


▼ 100% Avalanche Test

▼ Fast Switching

▼ Simple Drive Requirement

▼ RoHS Compliant

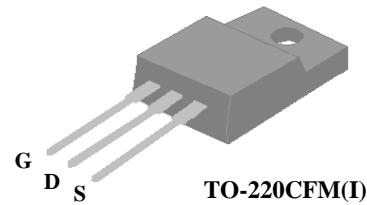


$BV_{DSS}$	650V
$R_{DS(ON)}$	0.75Ω
$I_D$	9A

## Description

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-220CFM isolation package is widely preferred for all commercial-industrial through hole applications.



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	5	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	40	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	42	W
	Linear Derating Factor	0.34	W/°C
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	40.5	mJ
$I_{AR}$	Avalanche Current	9	A
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Value	Units
$R_{thj-c}$	Maximum Thermal Resistance, Junction-case	3	°C/W
$R_{thj-a}$	Maximum Thermal Resistance, Junction-ambient	65	°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	$\text{V}_{\text{GS}}=0\text{V}$ , $\text{I}_D=1\text{mA}$	650	-	-	V
$\Delta \text{BV}_{\text{DSS}}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $\text{I}_D=1\text{mA}$	-	0.6	-	$\text{V}/^\circ\text{C}$
$\text{R}_{\text{DS(ON)}}$	Static Drain-Source On-Resistance <sup>3</sup>	$\text{V}_{\text{GS}}=10\text{V}$ , $\text{I}_D=4.5\text{A}$	-	-	0.75	$\Omega$
$\text{V}_{\text{GS(th)}}$	Gate Threshold Voltage	$\text{V}_{\text{DS}}=\text{V}_{\text{GS}}$ , $\text{I}_D=250\mu\text{A}$	2	-	4	V
$\text{g}_{\text{fs}}$	Forward Transconductance	$\text{V}_{\text{DS}}=50\text{V}$ , $\text{I}_D=4.5\text{A}$	-	4.5	-	S
$\text{I}_{\text{DSS}}$	Drain-Source Leakage Current	$\text{V}_{\text{DS}}=600\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$	-	-	10	$\mu\text{A}$
	Drain-Source Leakage Current ( $T_j=125^\circ\text{C}$ )	$\text{V}_{\text{DS}}=480\text{V}$ , $\text{V}_{\text{GS}}=0\text{V}$	-	-	500	$\mu\text{A}$
$\text{I}_{\text{GSS}}$	Gate-Source Leakage	$\text{V}_{\text{GS}}=\pm 30\text{V}$ , $\text{V}_{\text{DS}}=0\text{V}$	-	-	$\pm 100$	$\text{nA}$
$\text{Q}_g$	Total Gate Charge <sup>3</sup>	$\text{I}_D=9\text{A}$	-	44	-	nC
$\text{Q}_{\text{gs}}$	Gate-Source Charge	$\text{V}_{\text{DS}}=480\text{V}$	-	11	-	nC
$\text{Q}_{\text{gd}}$	Gate-Drain ("Miller") Charge	$\text{V}_{\text{GS}}=10\text{V}$	-	12	-	nC
$t_{\text{d(on)}}$	Turn-on Delay Time <sup>3</sup>	$\text{V}_{\text{DD}}=300\text{V}$	-	19	-	ns
$t_r$	Rise Time	$\text{I}_D=9\text{A}$	-	21	-	ns
$t_{\text{d(off)}}$	Turn-off Delay Time	$\text{R}_G=10\Omega$ , $\text{V}_{\text{GS}}=10\text{V}$	-	56	-	ns
$t_f$	Fall Time	$\text{R}_D=34\Omega$	-	24	-	ns
$C_{\text{iss}}$	Input Capacitance	$\text{V}_{\text{GS}}=0\text{V}$	-	2660	-	pF
$C_{\text{oss}}$	Output Capacitance	$\text{V}_{\text{DS}}=25\text{V}$	-	170	-	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance	f=1.0MHz	-	10	-	pF

### Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$\text{I}_S$	Continuous Source Current ( Body Diode )	$\text{V}_D=\text{V}_G=0\text{V}$ , $\text{V}_S=1.5\text{V}$	-	-	9	A
$\text{I}_{\text{SM}}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	40	A
$\text{V}_{\text{SD}}$	Forward On Voltage <sup>3</sup>	$T_j=25^\circ\text{C}$ , $\text{I}_S=9\text{A}$ , $\text{V}_{\text{GS}}=0\text{V}$	-	-	1.5	V

#### Notes:

- 1.Pulse width limited by Max. junction temperature.
- 2.Starting  $T_j=25^\circ\text{C}$  ,  $\text{V}_{\text{DD}}=50\text{V}$  ,  $\text{L}=1\text{mH}$  ,  $\text{R}_G=25\Omega$  ,  $\text{I}_{\text{AS}}=9\text{A}$ .
- 3.Pulse test

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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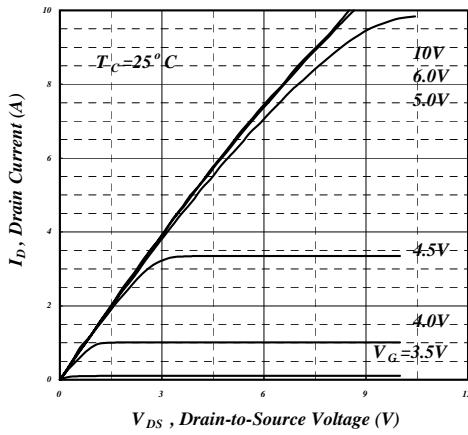


Fig 1. Typical Output Characteristics

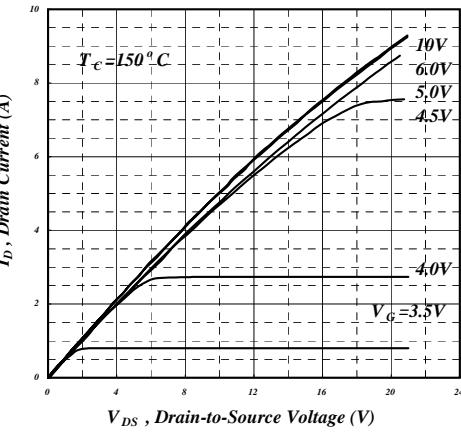


Fig 2. Typical Output Characteristics

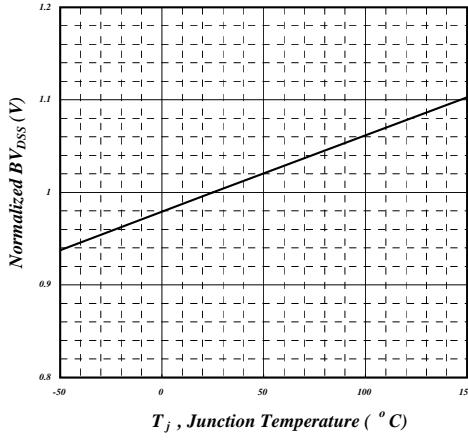
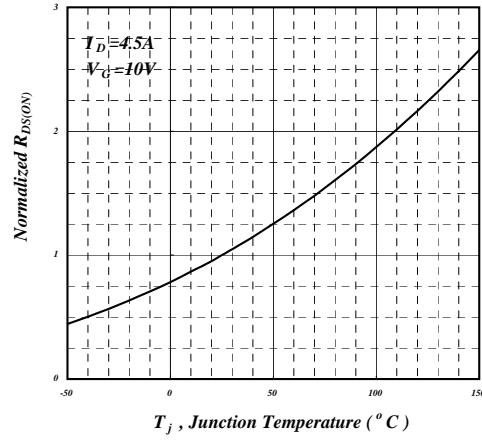
Fig 3. Normalized  $BV_{DSS}$  v.s. Junction Temperature

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

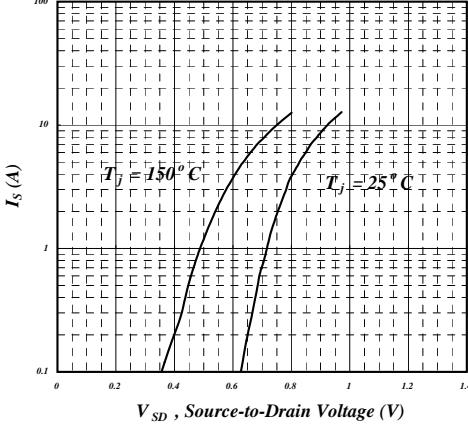


Fig 5. Forward Characteristic of Reverse Diode

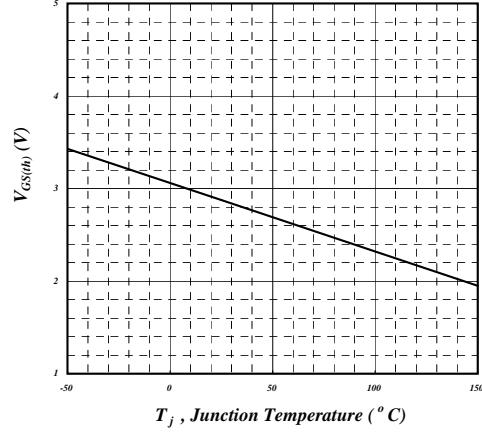
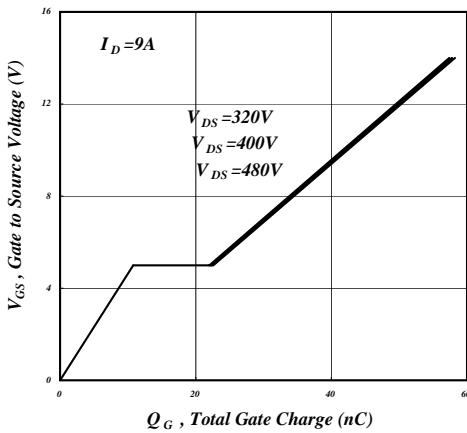
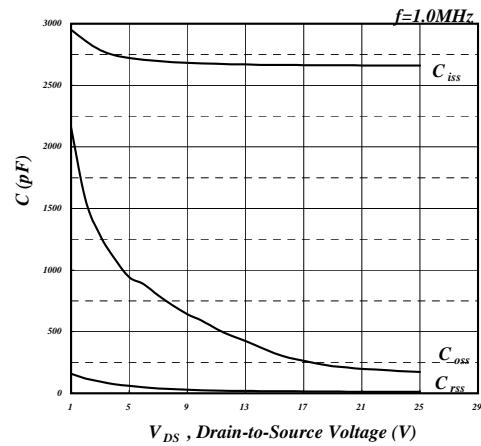
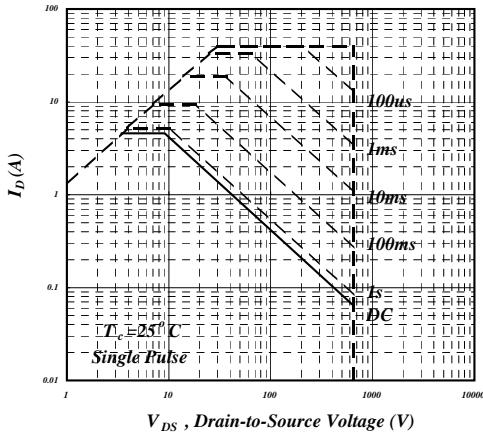
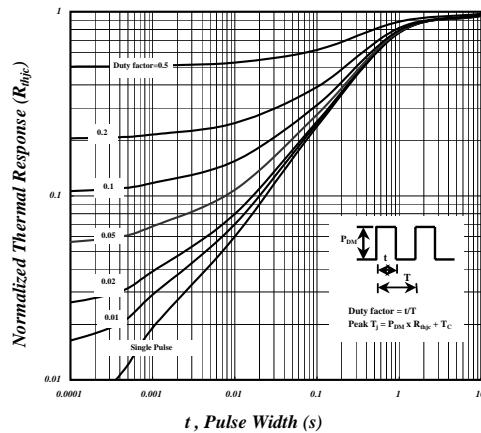
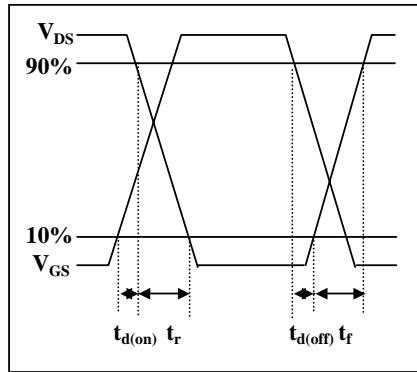
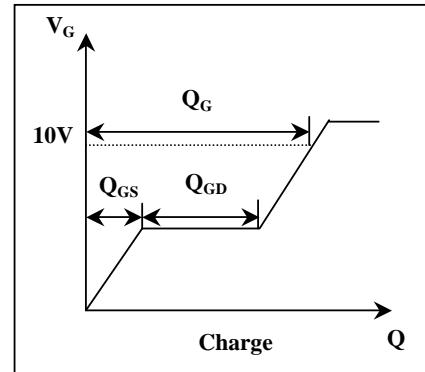


Fig 6. Gate Threshold Voltage v.s. Junction Temperature


**Fig 7. Gate Charge Characteristics**

**Fig 8. Typical Capacitance Characteristics**

**Fig 9. Maximum Safe Operating Area**

**Fig 10. Effective Transient Thermal Impedance**

**Fig 11. Switching Time Waveform**

**Fig 12. Gate Charge Waveform**