

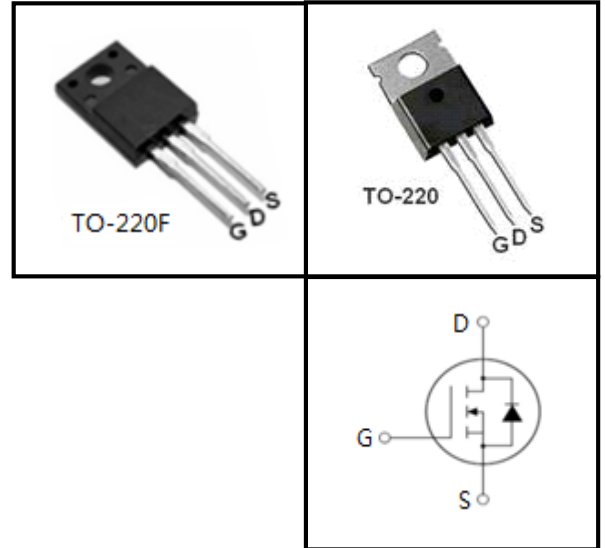
500V N-Channel MOSFET

FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)



Device Marking and Package Information

Device	Package	Marking
CS15N50F	TO-220F	CS15N50F
CS15N50P	TO-220	CS15N50P

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Drain-Source Voltage ($V_{GS} = 0V$)	V_{DSS}	500		V
Continuous Drain Current	I_D	15		A
Pulsed Drain Current (note1)	I_{DM}	60		A
Gate-Source Voltage	V_{GSS}	± 30		V
Single Pulse Avalanche Energy (note2)	E_{AS}	352.8		mJ
Avalanche Current (note1)	I_{AS}	8.4		A
Repetitive Avalanche Energy (note1)	E_{AR}	229.3		mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	32	65	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	$-55 \sim +150$		$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value		Unit
		TO-220F	TO-220	
Thermal Resistance, Junction-to-Case	R_{thJC}	1.92	0.89	K/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	62.5	60	

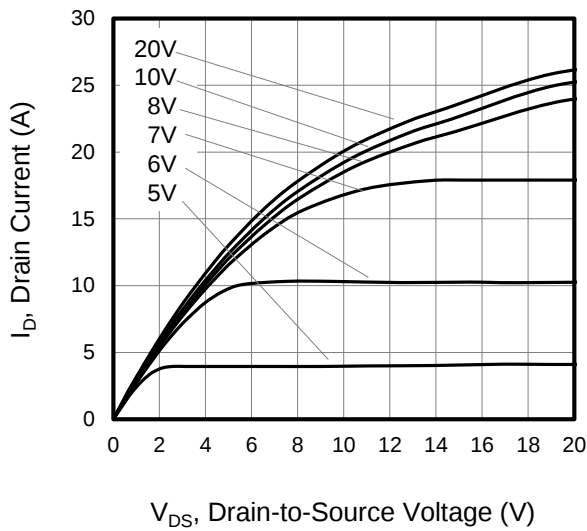
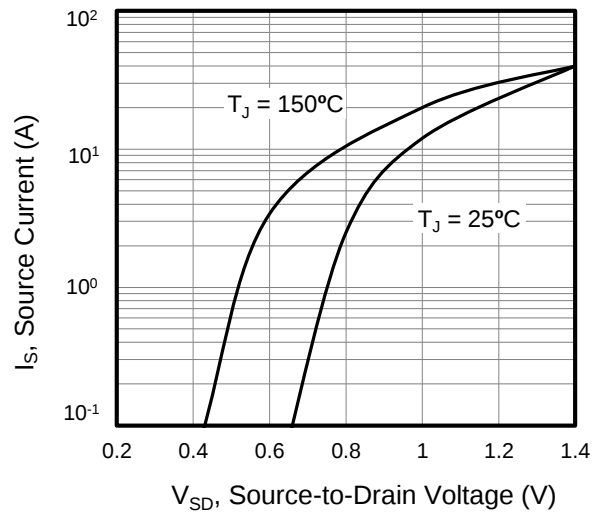
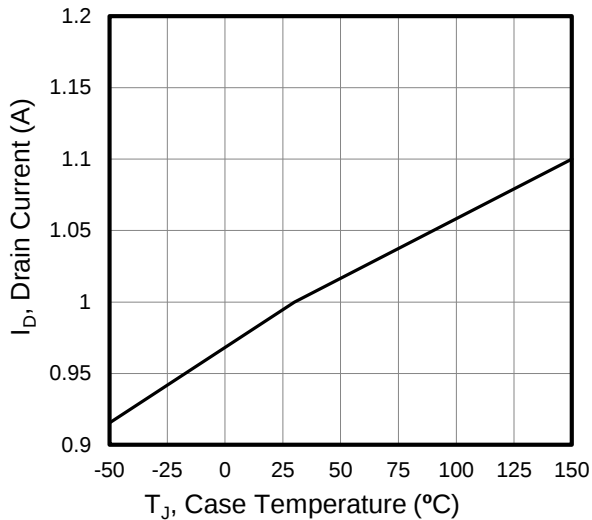
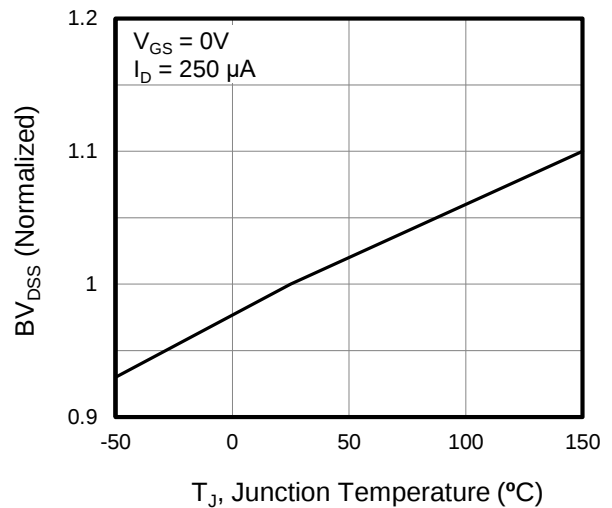
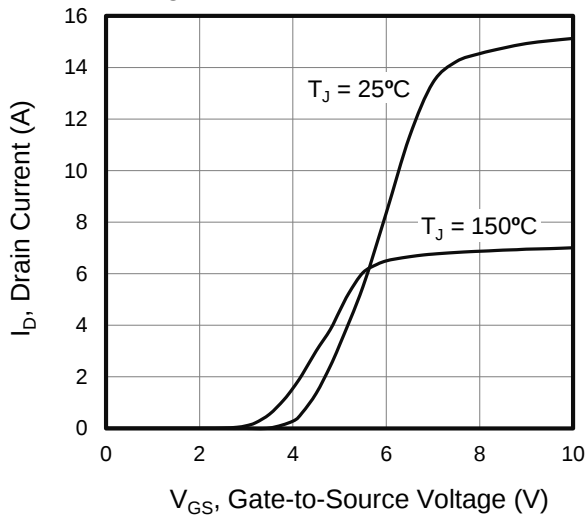
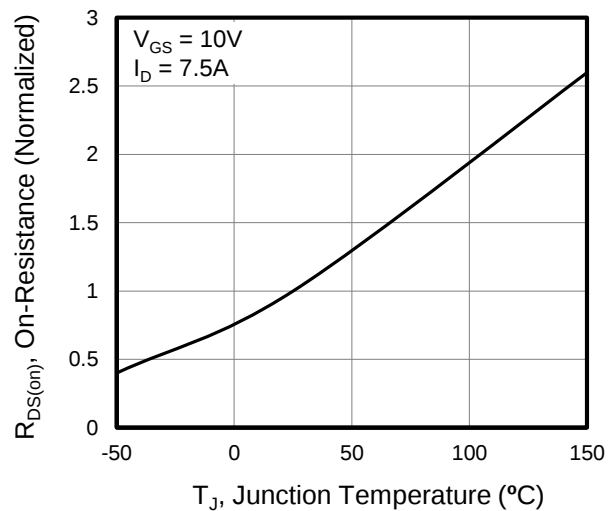
Specifications $T_J = 25^{\circ}\text{C}$, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	500	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500V, V _{GS} = 0V, T _J = 25°C	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	R _{DS(on)}	V _{GS} = 10V, I _D = 7.5A	--	0.35	0.42	Ω
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	1752	--	pF
Output Capacitance	C _{oss}		--	185	--	
Reverse Transfer Capacitance	C _{rss}		--	13.5	--	
Total Gate Charge	Q _g	V _{DD} = 400V, I _D = 15A, V _{GS} = 10V	--	44	--	nC
Gate-Source Charge	Q _{gs}		--	7.5	--	
Gate-Drain Charge	Q _{gd}		--	19	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 250V, I _D =15A, R _G = 25 Ω	--	45.5	--	ns
Turn-on Rise Time	t _r		--	27	--	
Turn-off Delay Time	t _{d(off)}		--	193	--	
Turn-off Fall Time	t _f		--	45	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25 °C	--	--	15	A
Pulsed Diode Forward Current	I _{SM}		--	--	60	
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 7.5A, V _{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} = 0V, I _S = 15A, di _F /dt =100A /μs	--	472	--	ns
Reverse Recovery Charge	Q _{rr}		--	3.24	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 10.0mH, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

Figure 2. Body Diode Forward Voltage

Figure 3. Drain Current vs. Temperature

Figure 4. BV_{DSS} Variation vs. Temperature

Figure 5. Transfer Characteristics

Figure 6. On-Resistance vs. Temperature


Typical Characteristics $T_j = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

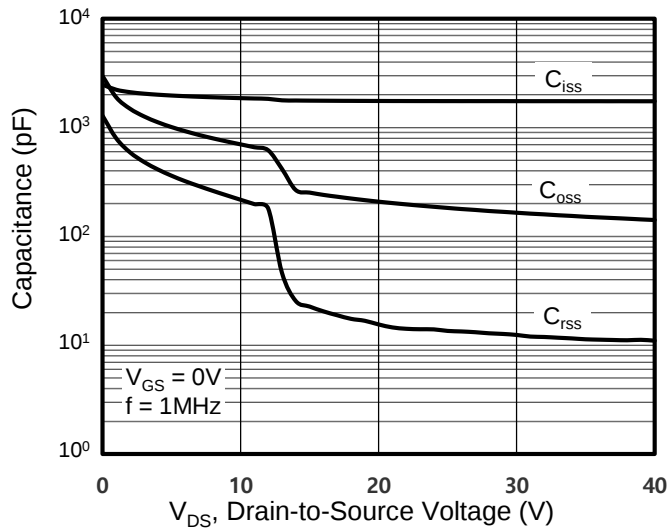


Figure 8. Gate Charge

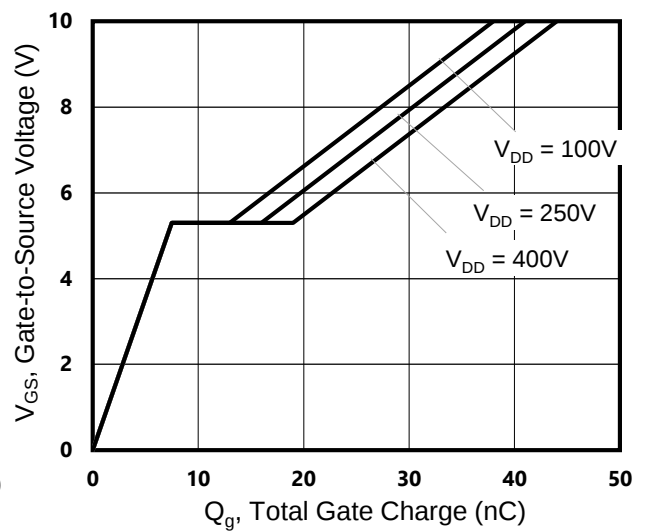


Figure 9. Transient Thermal Impedance
TO-220F

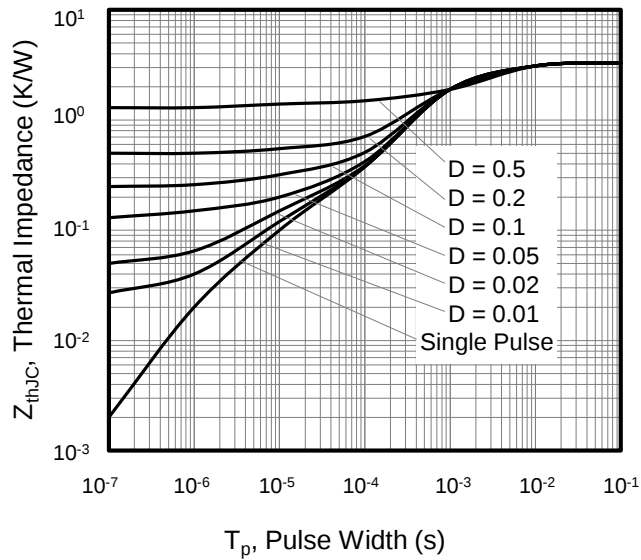


Figure 10. Transient Thermal Impedance
TO-220

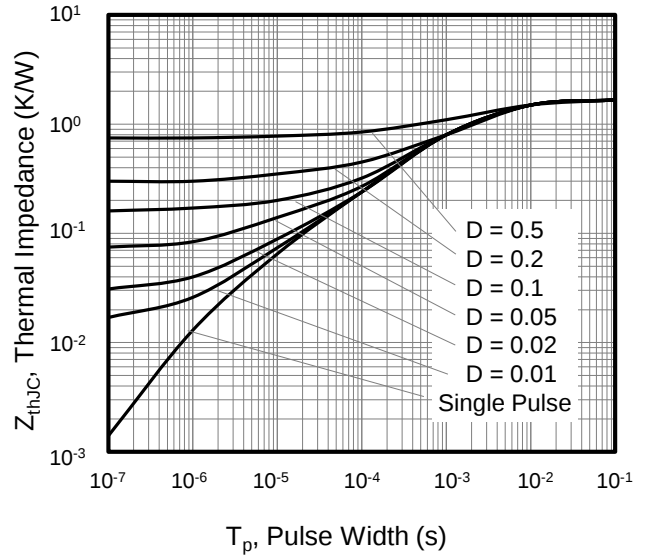
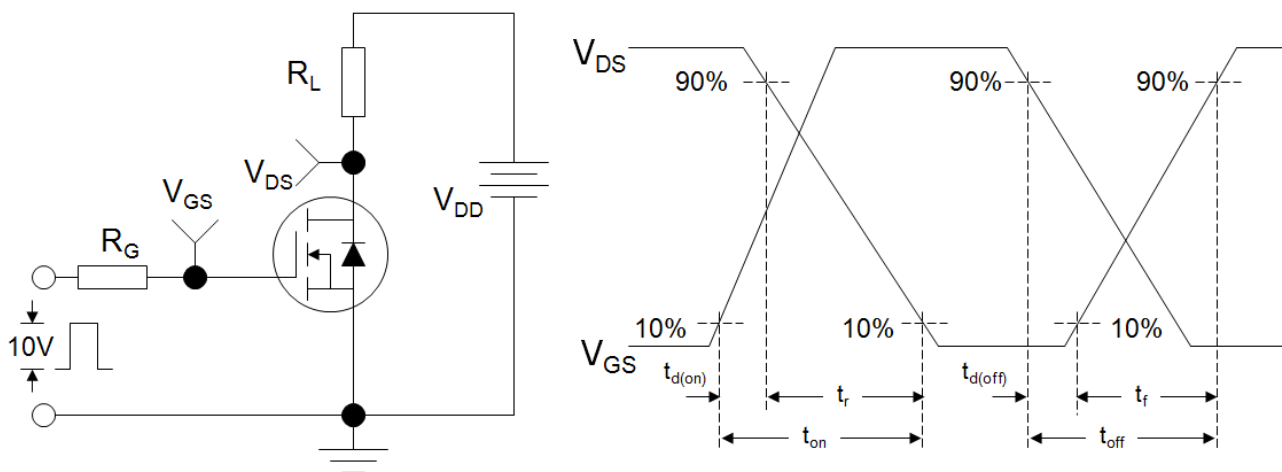


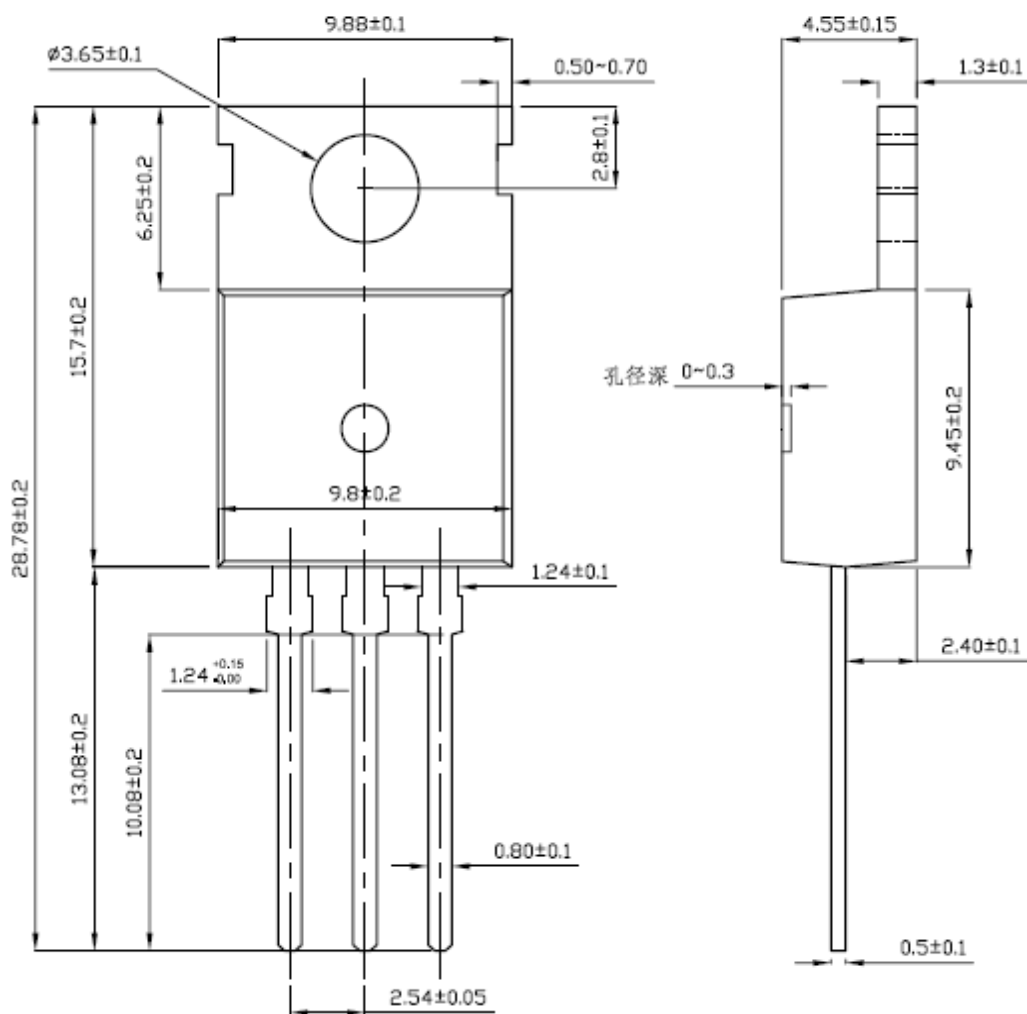
Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


TO-220F



TO-220



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