

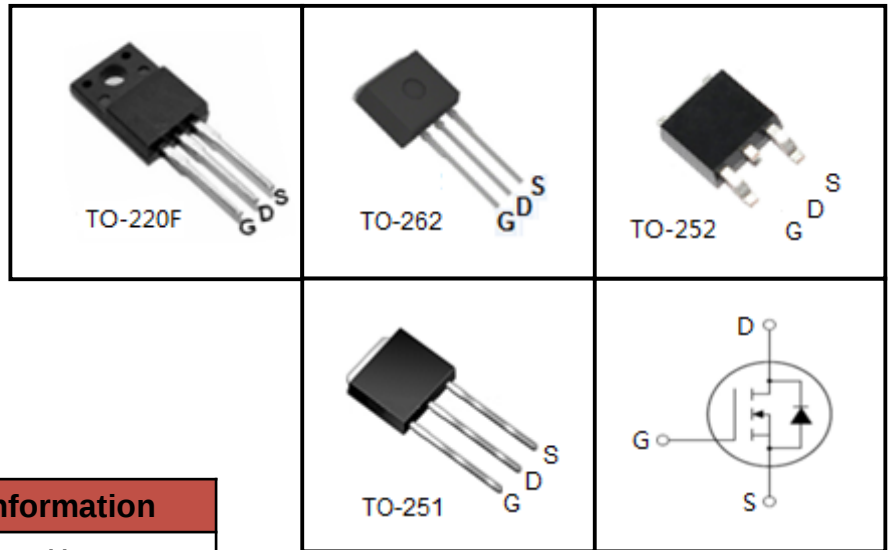
600V N-Channel MOSFET

FEATURES

- Fast switching
- Integrate fast recovery diode
- Fast switching speed
- 100% avalanche tested
- Improved dv/dt capability

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Motor Controls
- Power Factor Correction (PFC)



Device Marking and Package Information

Device	Package	Marking
CSFR7N60F	TO-220F	CSFR7N60F
CSFR7N60K	TO-262	CSFR7N60K
CSFR7N60D	TO-252	CSFR7N60D
CSFR7N60U	TO-251	CSFR7N60U

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

Parameter	Symbol	Value				Unit
		TO-220F	TO-262	TO-252	TO-251	
Drain-Source Voltage (V _{GS} = 0V)	V _{DSS}	600				V
Continuous Drain Current	I _D	7				A
Pulsed Drain Current (note1)	I _{DM}	28				A
Gate-Source Voltage	V _{GSS}	±30				V
Single Pulse Avalanche Energy (note2)	E _{AS}	224.5				mJ
Avalanche Current (note1)	I _{AS}	6.7				A
Repetitive Avalanche Energy (note1)	E _{AR}	134.7				mJ
Power Dissipation (T _C = 25°C)	P _D	63	97			W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55~+150				°C

Thermal Resistance

Parameter	Symbol	Value				Unit
		TO-220F	TO-262	TO-252	TO-251	
Thermal Resistance, Junction-to-Case	R _{thJC}	1.98	1.29			°C/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	600	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600V, 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 = 3.5A	--	1.1	1.3	Ω
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	912	--	pF
Output Capacitance	C _{oss}		--	92	--	
Reverse Transfer Capacitance	C _{rss}		--	11	--	
Total Gate Charge	Q _g	V _{DD} = 480V, I _D = 7.0A, V _{GS} = 10V	--	28	--	nC
Gate-Source Charge	Q _{gs}		--	4.3	--	
Gate-Drain Charge	Q _{gd}		--	14	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} 300V, I _D =7A, R _G =25Ω	--	38.5	--	ns
Turn-on Rise Time	t _r		--	14	--	
Turn-off Delay Time	t _{d(off)}		--	119	--	
Turn-off Fall Time	t _f		--	54	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25 °C	--	--	7.0	A
Pulsed Diode Forward Current	I _{SM}		--	--	28	
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 3.5A, V _{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} = 0V, I _S = 7A, diF/dt = 100A/μs	--	82	--	ns
Reverse Recovery Charge	Q _{rr}		--	0.12	--	μC

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=10mH, V_{DD} = 50V, R_G = 25\Omega$, 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 ($T_J = 25^\circ\text{C}$)

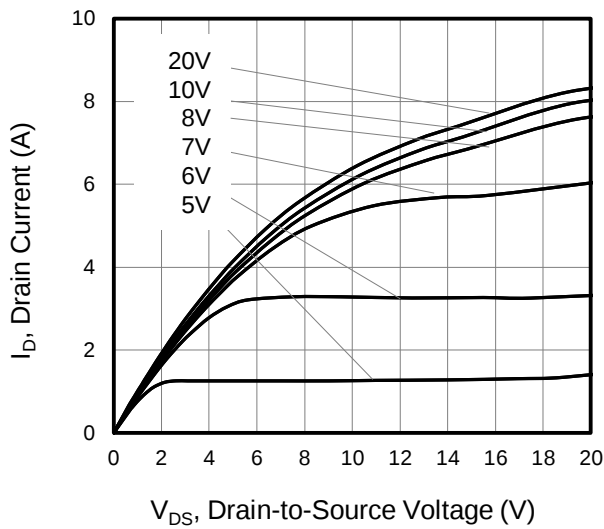


Figure 2. Body Diode Forward Voltage

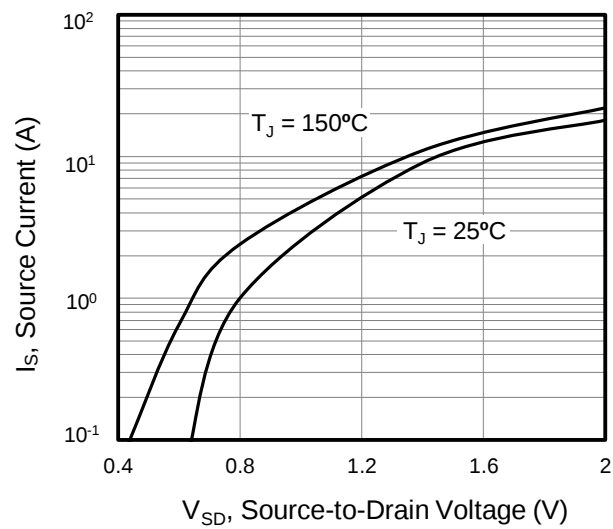


Figure 3. Drain Current vs. Temperature

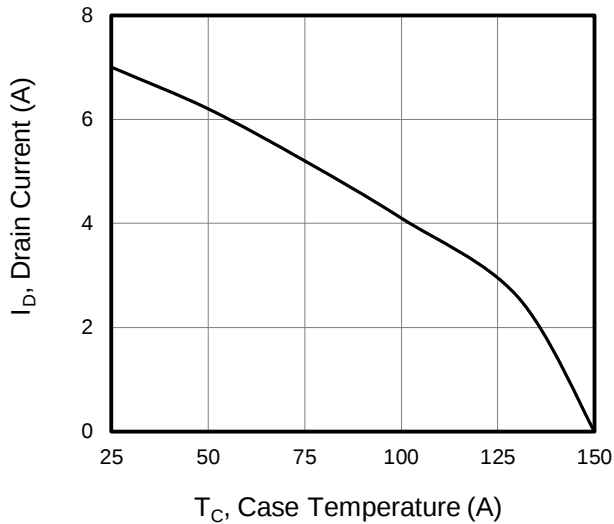


Figure 4. BV_{DSS} Variation vs. Temperature

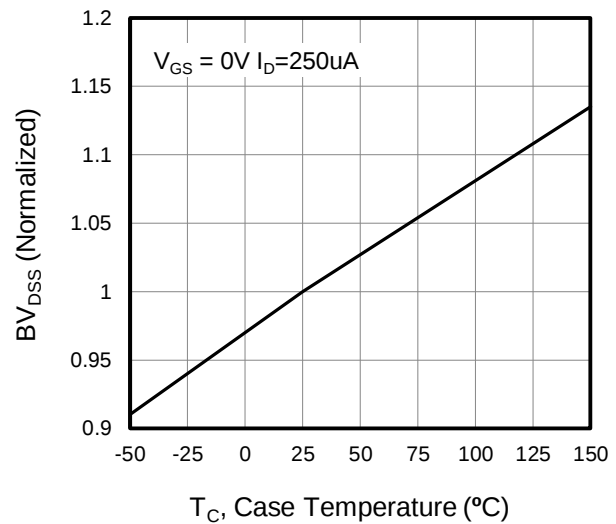


Figure 5. Transfer Characteristics

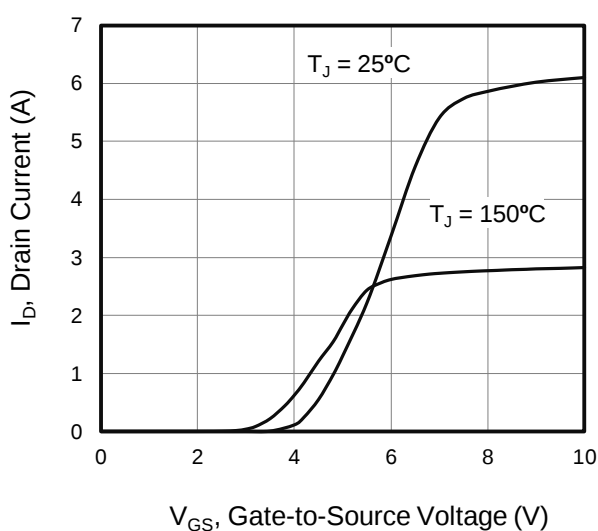
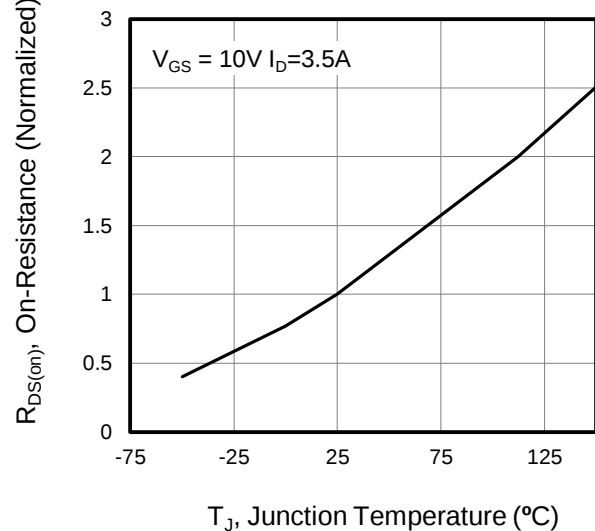


Figure 6. On-Resistance vs. Temperature



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

Figure 7. Capacitance

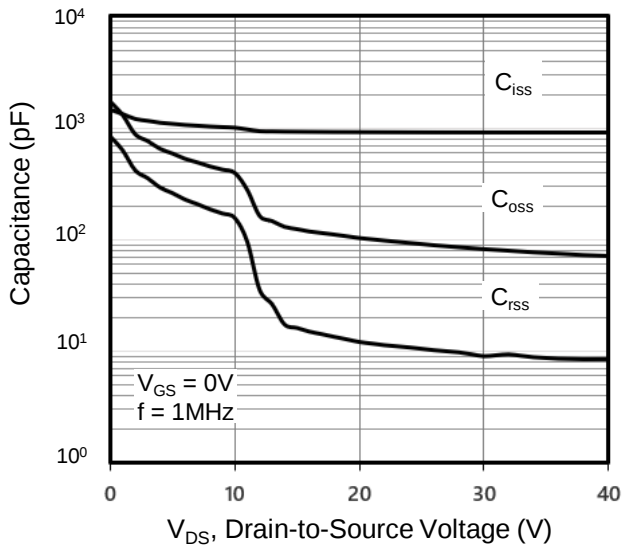


Figure 8. Gate Charge

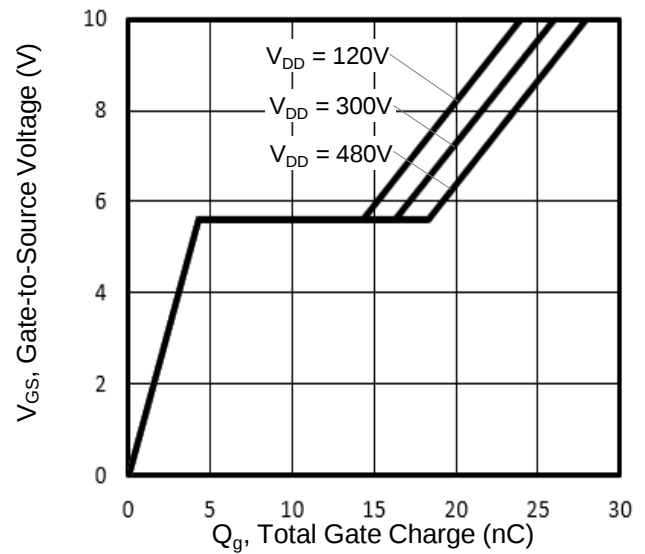


Figure 9. Transient Thermal Impedance
TO-262, TO-251, TO-252

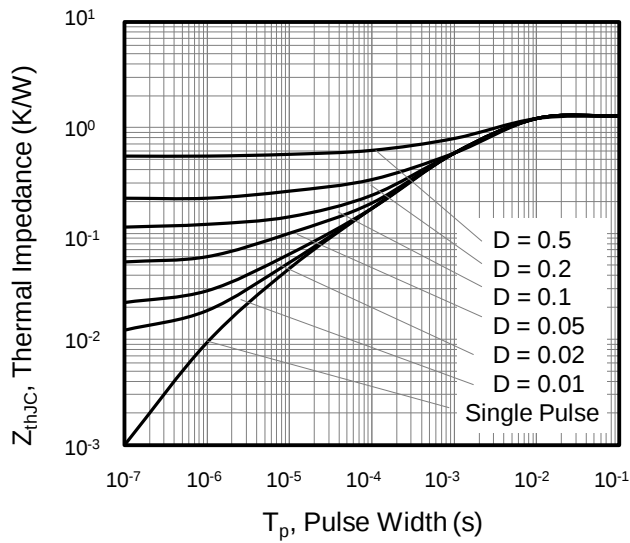


Figure 10. Transient Thermal Impedance
TO-220F

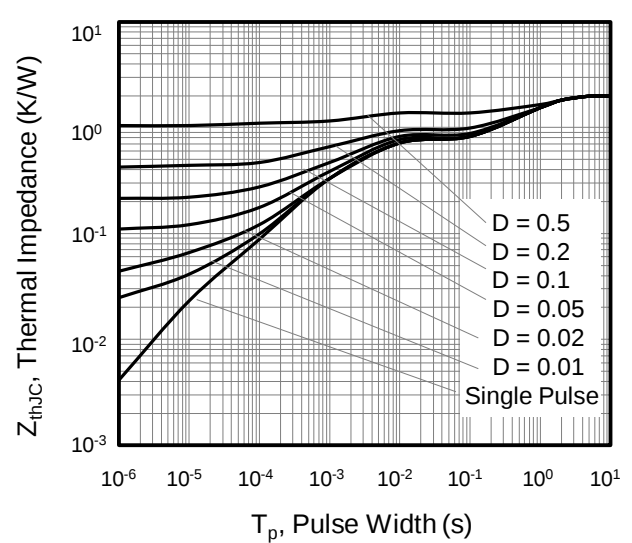
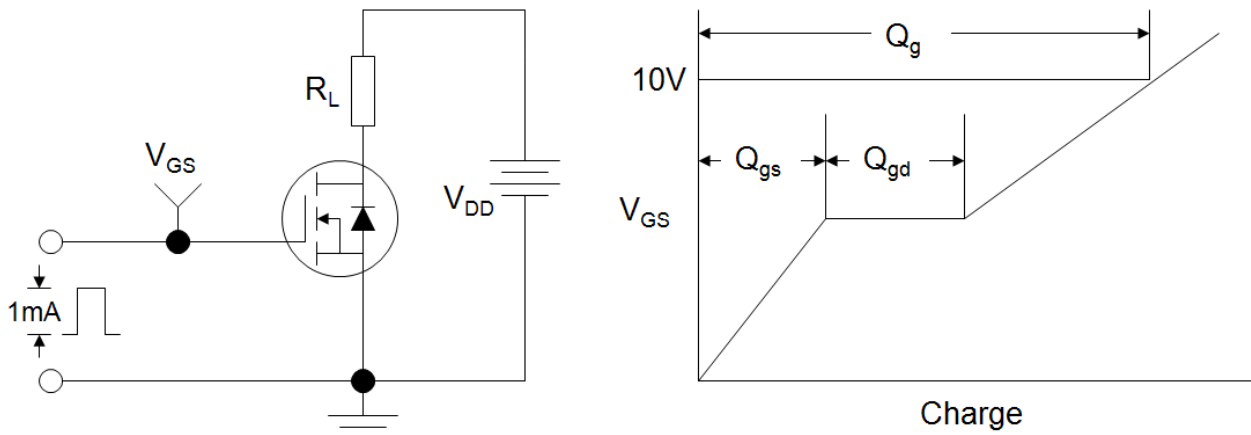
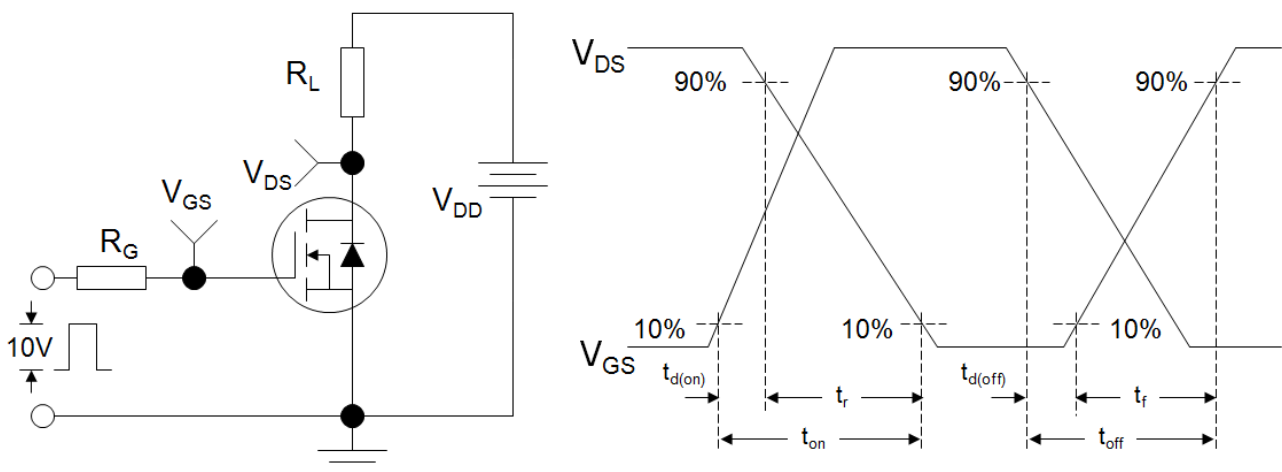
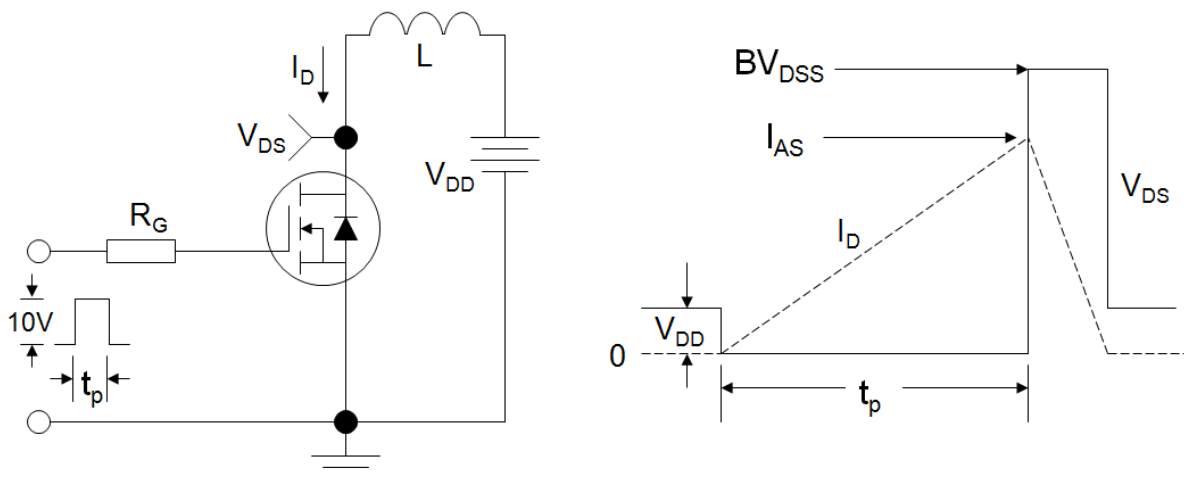
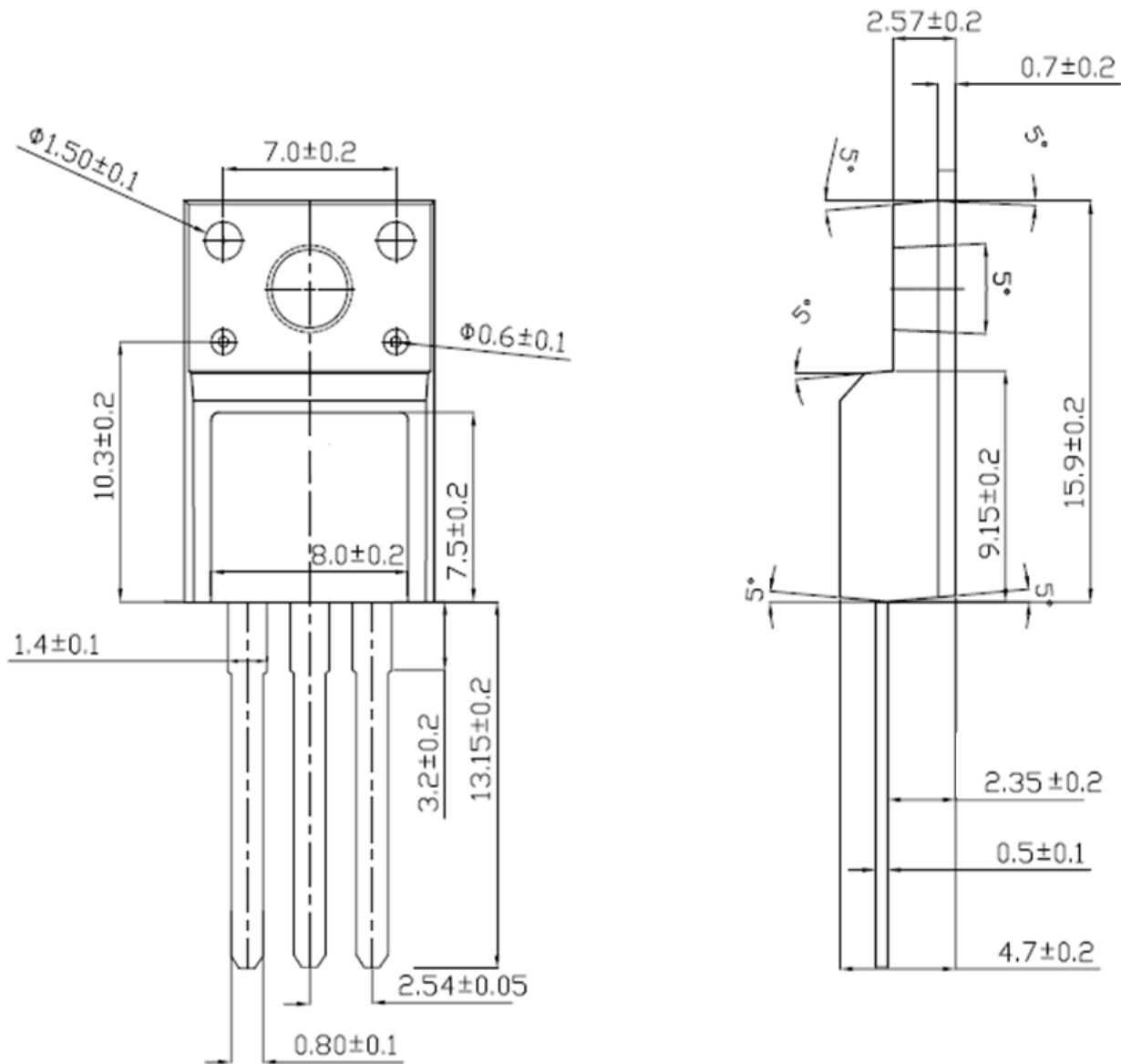
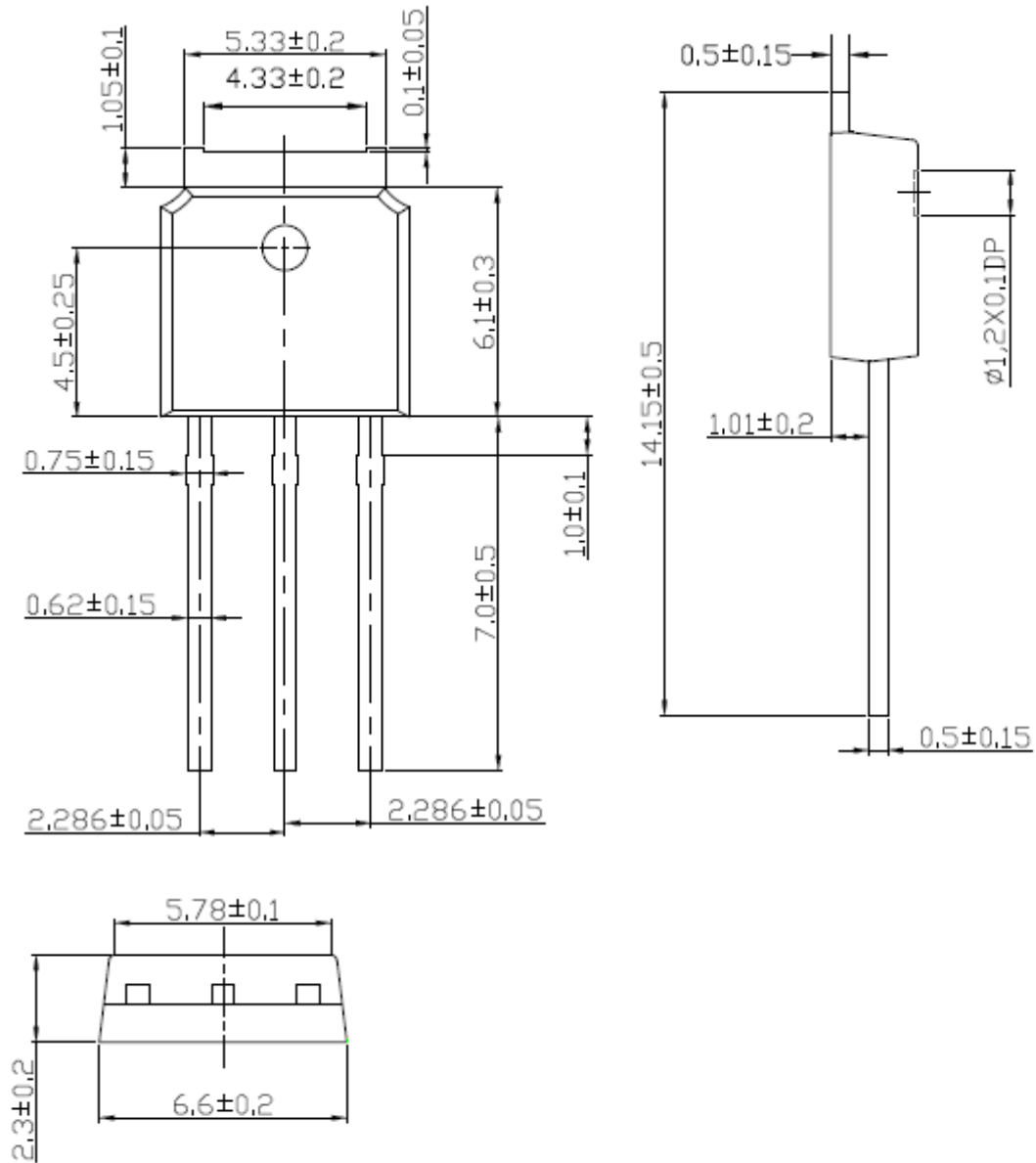


Figure A: Gate Charge Test Circuit and Waveform

Figure B: Resistive Switching Test Circuit and Waveform

Figure C: Unclamped Inductive Switching Test Circuit and Waveform


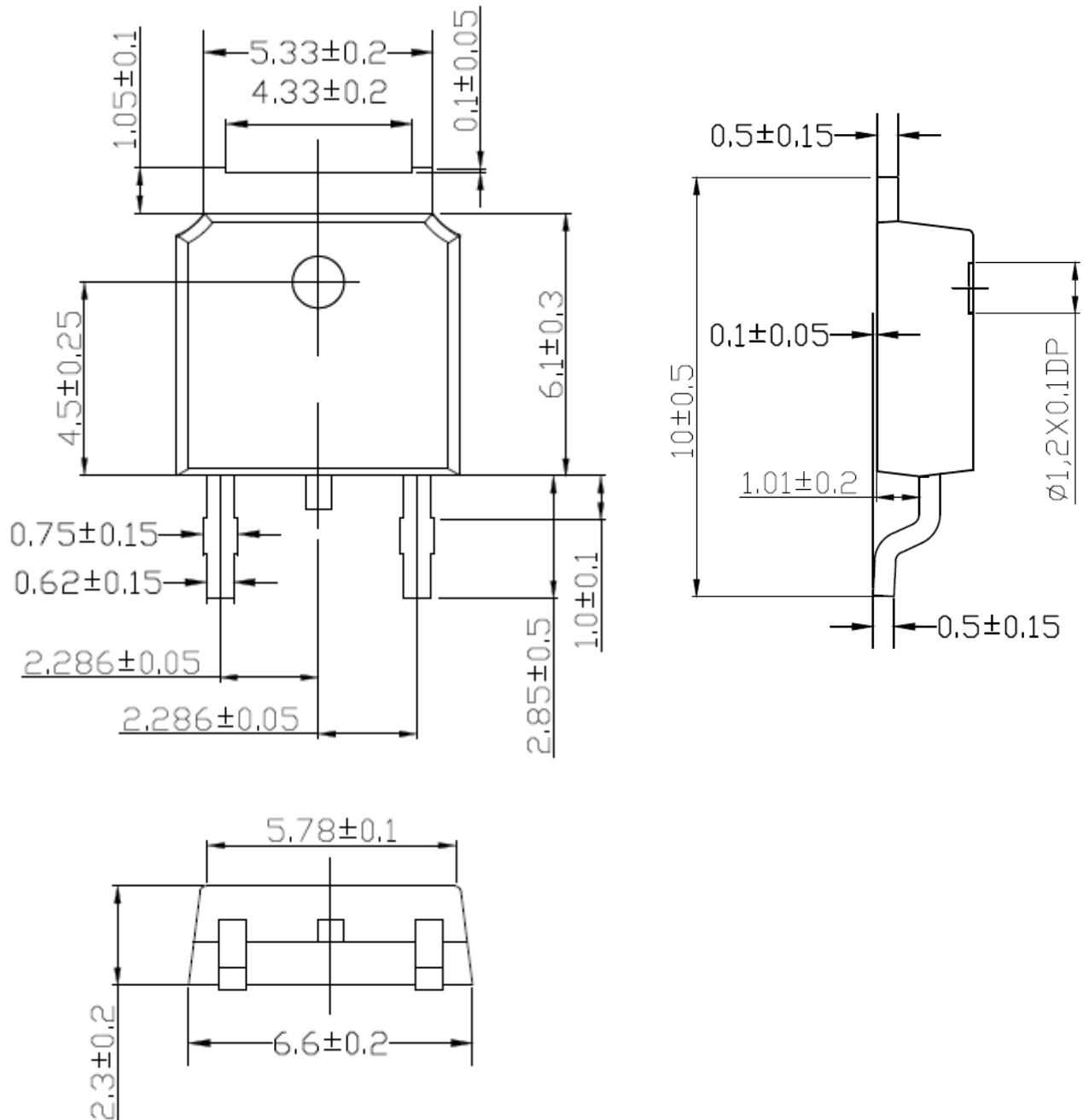
TO-220F



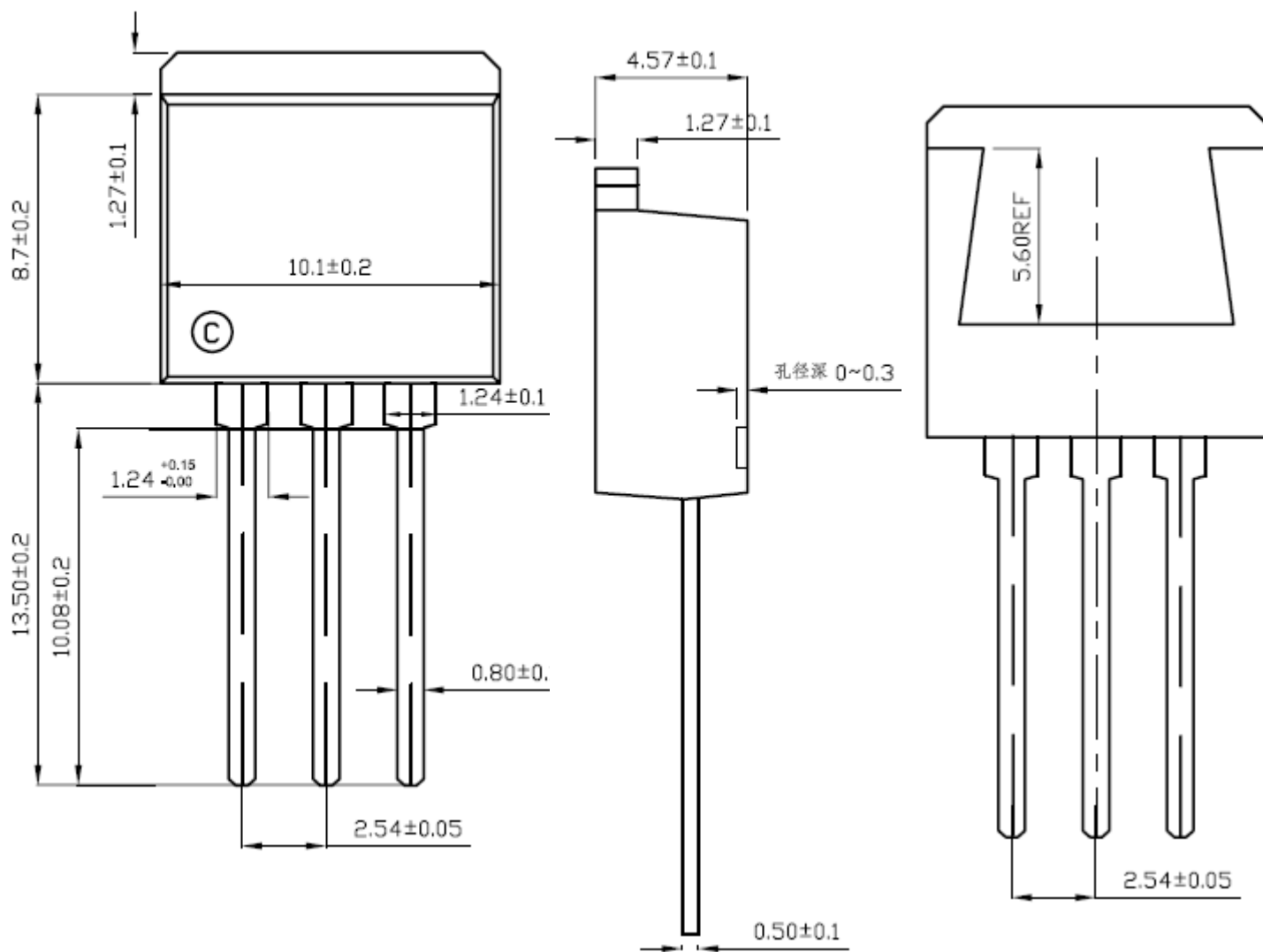
TO-251



TO-252



TO-262



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