

### MAIN CHARACTERISTICS

$I_D$	13A
$V_{DSS}$	500V
$R_{DS(on)-typ}$ (@ $V_{GS}=10V$ )	0.46 $\Omega$

### FEATURES

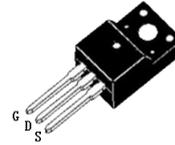
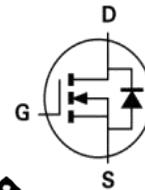
- Fast Switching
- Low ON Resistance
- Low Gate Charge
- 100% Single Pulse avalanche energy Test

### APPLICATIONS

- Power switch circuit of adaptor and charger.

### MECHANICAL DATA

- Case: Molded plastic
- Mounting Position: Any
- Molded Plastic: UL Flammability Classification Rating 94V-0
- Lead free in compliance with EU RoHS 2011/65/EU directive
- Solder bath temperature 275 $^{\circ}C$  maximum, 10s per JESD 22-B106



TO-220F



TO-220C



TO-263C

### Product specification classification

Part Number	Package	Mode Name	Pack
CS13N50S2	TO-220F (0.5mm)	CS13N50S	Tube
CS13N50SP	TO-220C	CS13N50S	TSpe
CS13N50ST	TO-263C	CS13N50S	TSpe
CS13N50ST-R	TO-263C	CS13N50S	TSpe

### Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbol	Value		Unit
		220F	220C/263C	
Drain-Source Voltage	$V_{DS}$	500		V
Gate-Source Voltage	$V_{GS}$	±30		V
Continue Drain Current	$I_D$	13		A
Pulsed Drain Current (Note1)	$I_{DM}$	52		A
Power Dissipation	$P_D$	50	179	W
Single Pulse Avalanche Energy (Note1)	$E_{AS}$	414		mJ
Operating Temperature Range	$T_J$	150		°C
Storage Temperature Range	$T_{STG}$	-55 to +150		°C
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.5	0.59	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	62.5	62.5	°C/W

Note1:Pulse test: 300 μs pulse width, 2 % duty cycle

### Electrical Characteristics at Tc=25°C unless otherwise specified

Characteristics	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = 0 V, I_D = 250 \mu A$	$BV_{DSS}$	500	-	-	V
Drain-Source Leakage Current	$V_{DS} = 500 V, V_{GS} = 0 V$	$I_{DSS}$	-	-	1	μA
Gate Leakage Current	$V_{GS} = \pm 30 V, V_{DS} = 0 V$	$I_{GSS}$	-	-	±100	nA
Gate-Source Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu A$	$V_{GS(th)}$	2	-	4	V
Drain-Source On-State Resistance	$V_{GS} = 10 V, I_D = 6.5 A$	$R_{DS(on)}$	-	0.46	0.6	Ω
Forward Transconductance	$V_{DS} = 15 V, I_D = 6.5 A$	$g_{fs}$	-	13	-	S
Input Capacitance	$V_{GS} = 0 V, V_{DS} = 25 V,$ $f = 1 MHz$	$C_{iss}$	-	1620	-	pF
Output Capacitance		$C_{oss}$	-	150	-	pF
Reverse Transfer Capacitance		$C_{rss}$	-	18	-	pF
Turn-on Delay Time(Note2)	$I_D = 13 A, V_{DD} = 250 V,$ $R_G = 10 \Omega$	$t_{d(ON)}$	-	26	-	ns
Rise Time(Note2)		$t_r$	-	40	-	ns
Turn-Off Delay Time(Note2)		$t_{d(OFF)}$	-	92	-	ns
Fall Time(Note2)		$t_f$	-	42	-	ns
Total Gate Charge(Note2)	$I_D = 13 A, V_{DD} = 250 V,$ $V_{GS} = 10 V$	$Q_G$	-	33	-	nC
Gate to Source Charge(Note2)		$Q_{GS}$	-	9.7	-	nC
Gate to Drain Charge(Note2)		$Q_{GD}$	-	11	-	nC

### Source-Drain Diode Characteristics at Ta=25°C unless otherwise specified

Characteristics	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Maximun Body-Diode Continuous Current		$I_S$	-	-	13	A
Maximun Body-Diode Pulsed Current(Note2)		$I_{SM}$	-	-	52	A
Drain-Source Diode Forward Voltage	$I_{SD} = 13 A$	$V_{SD}$	-	-	1.4	V
Reverse Recovery Time(Note2)	$I_{SD} = 13 A, V_{GS} = 0 V,$ $di_F / dt = 100 A/\mu s$	$t_{rr}$	-	386	-	ns
Reverse Recovery Charge(Note2)		$Q_{rr}$	-	4.2	-	μC

Note2:Pulse test: 300 μs pulse width, 2 % duty cycle

### RATINGS AND CHARACTERISTIC CURVES

Figure 1: Output Characteristics

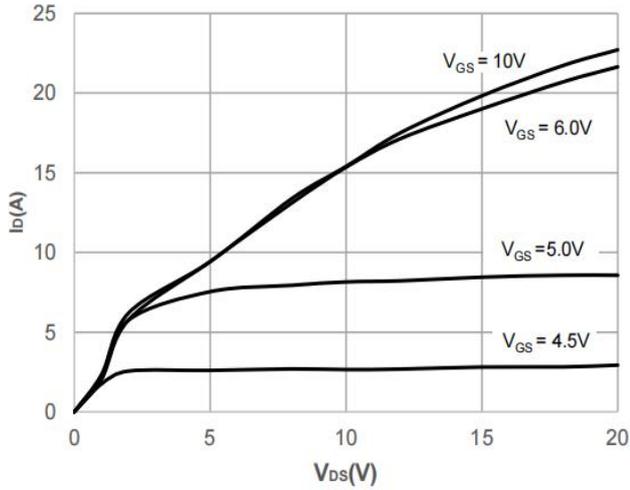


Figure 2: Typical Transfer Characteristics

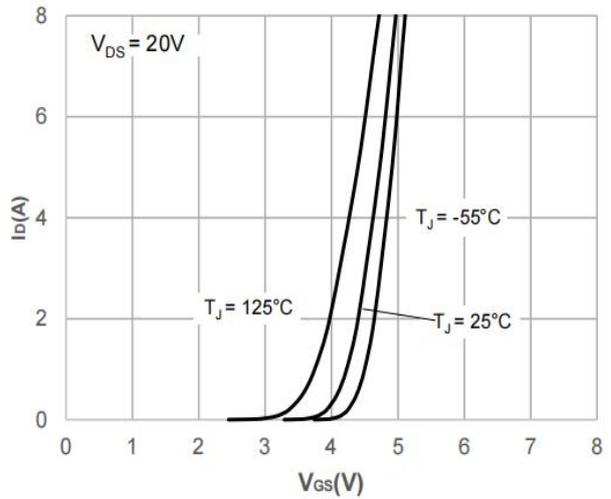


Figure 3: On-resistance vs. Drain Current

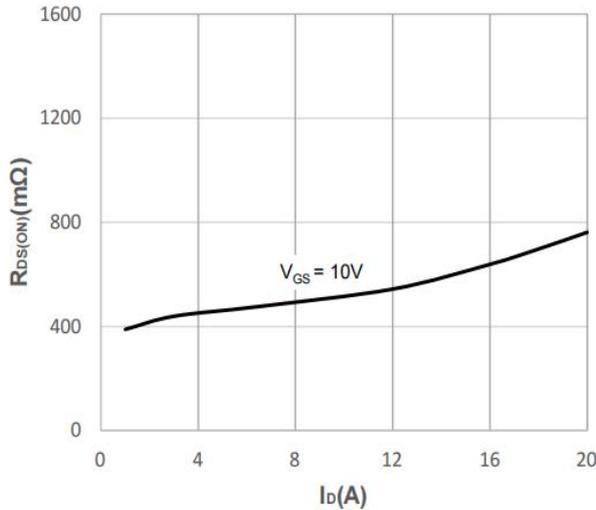


Figure 4: Body Diode Characteristics

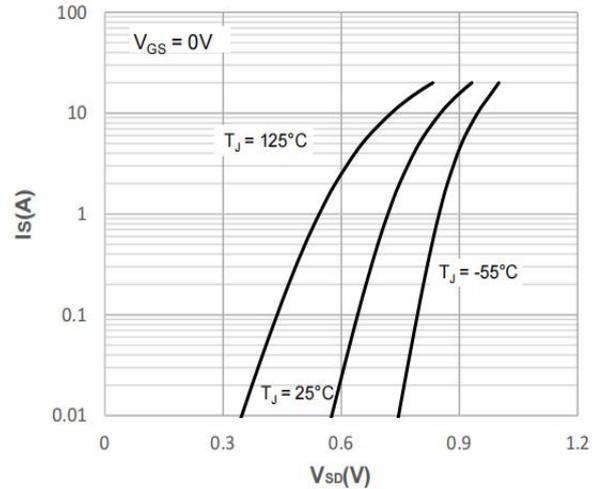


Figure 5: Gate Charge Characteristics

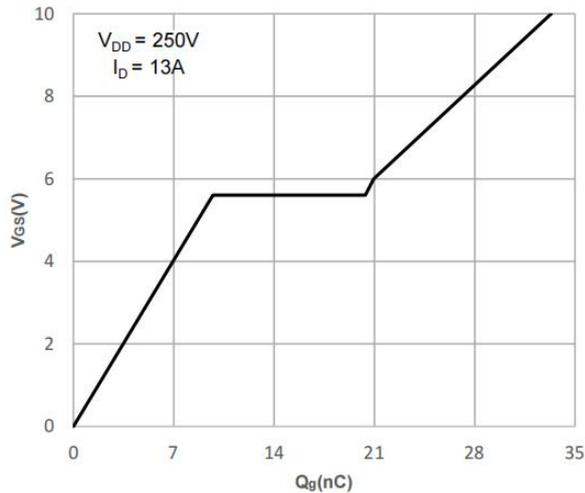
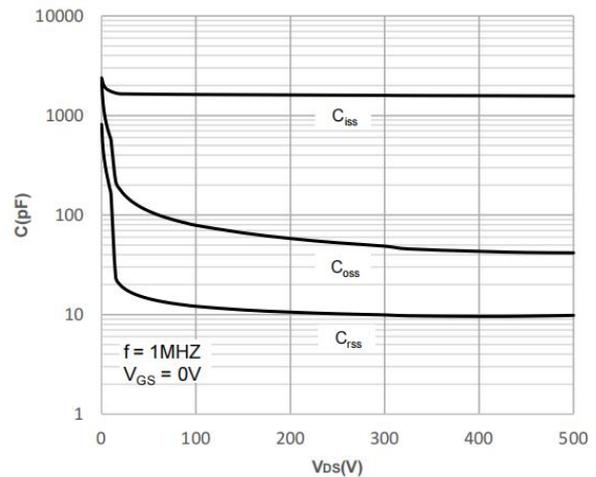


Figure 6: Capacitance Characteristics



### RATINGS AND CHARACTERISTIC CURVES

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

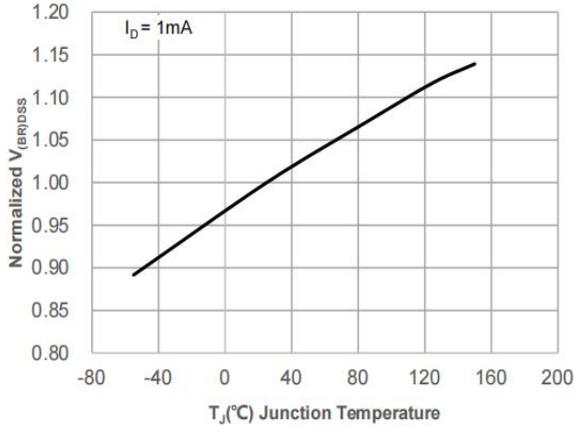


Figure 8: Normalized on Resistance vs. Junction Temperature

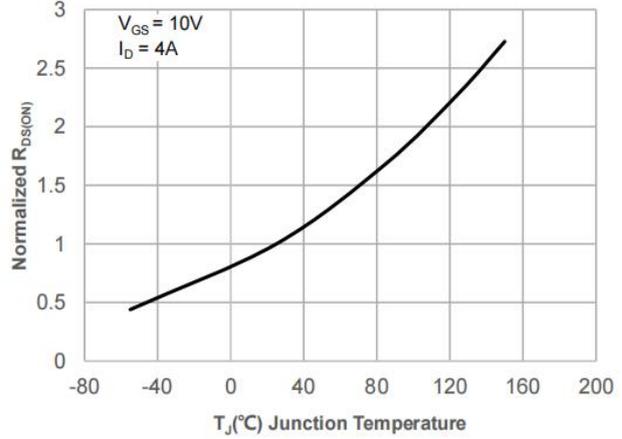


Figure 9: Maximum Safe Operating Area

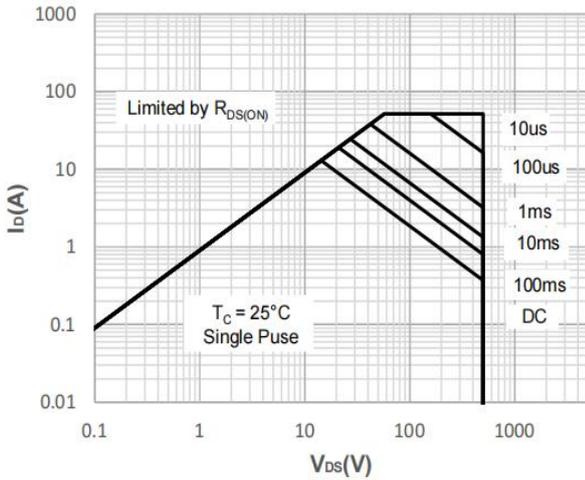


Figure 10: Maximum Continuous Drianc Current vs. Case Temperature

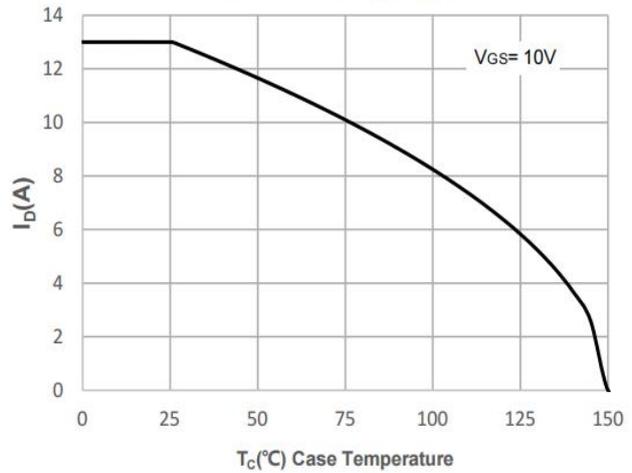


Figure 11: Normalized Maximum Transient Thermal Impedance

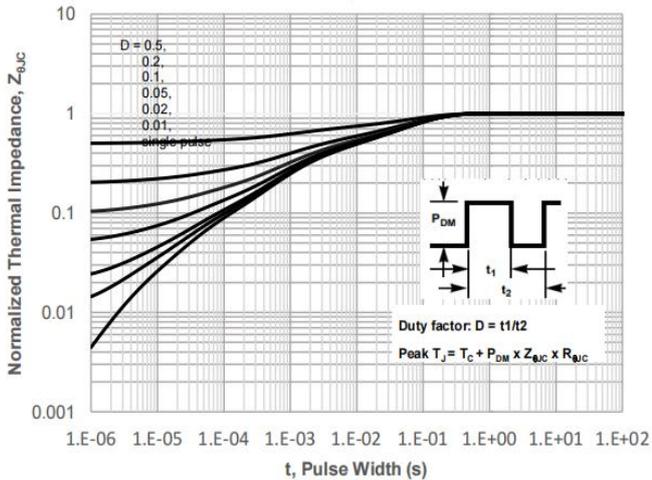
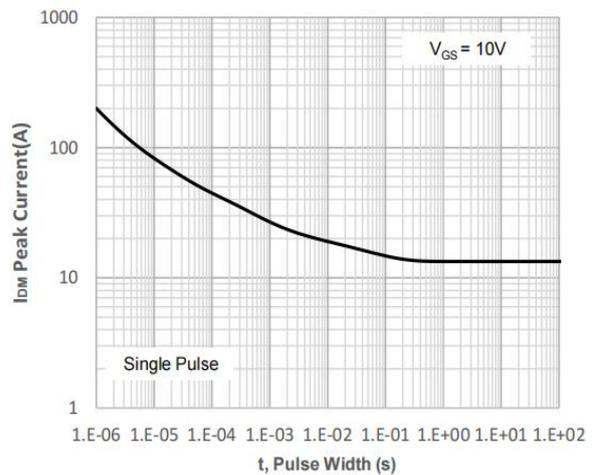
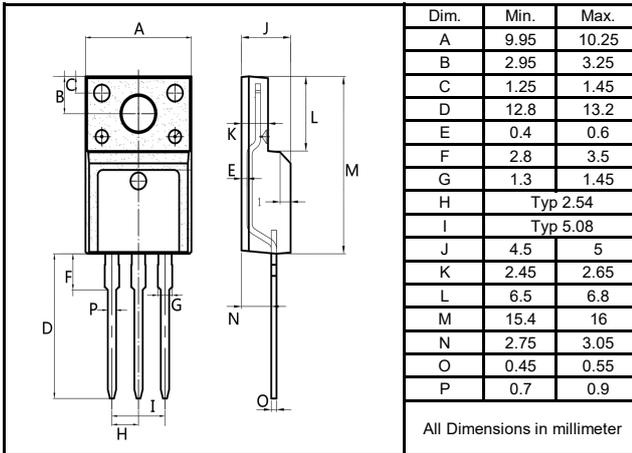
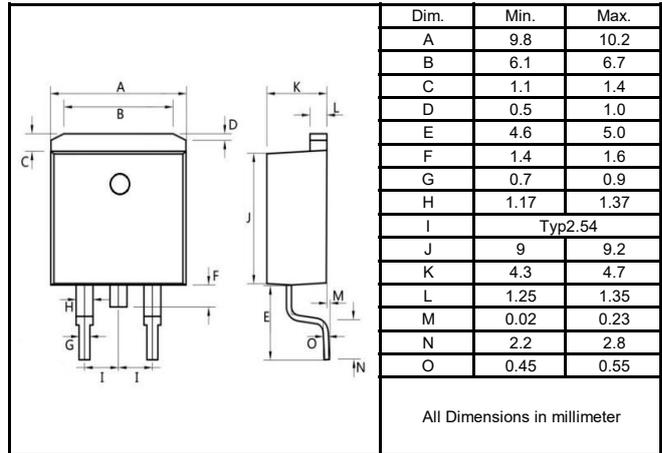
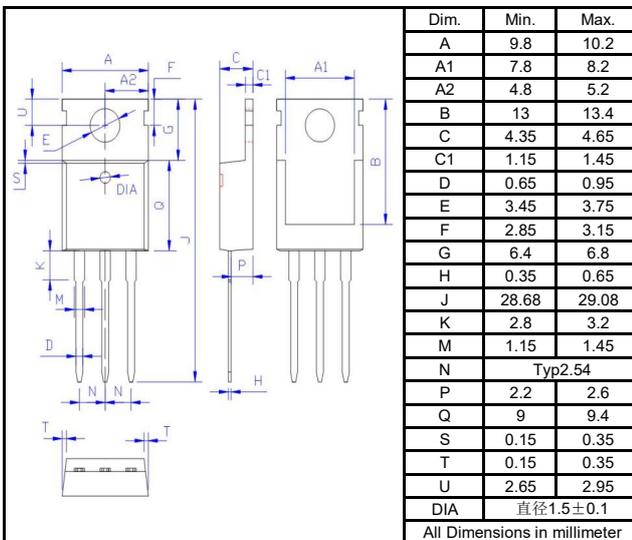


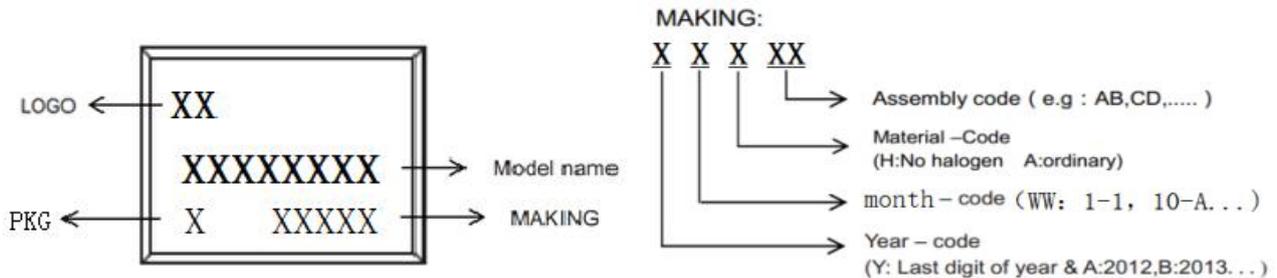
Figure 12: Peak Current Capacity



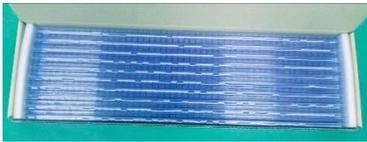
### Package Outline Dimensions millimeters

**T0-220F**

**T0-263C**

**T0-220C**


### Marking on the body



### packing instruction

PKG	最小包装	内盒	外箱
TO-220F TO-220C TO-263C			
	50pcs/管	1000pcs/盒	5000pcs/箱
TO-263C-R			
	800pcs/盘	1600pcs/盒	8000pcs/箱

### Notice

All product, product specifications and data are subject to change without notice to improve. The right to explain is owned by LINGXUN electronics company.

Confirm that operation temperature is within the specified range described in the product specification. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

LINGXUN electronics shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.