Descriptions

This is N-CHANNEL 650V 95mΩ Super-Junction Power MOSFET in a TO-220F Plastic Package

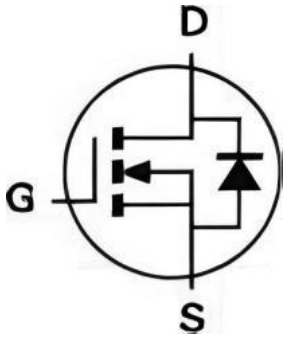
Features

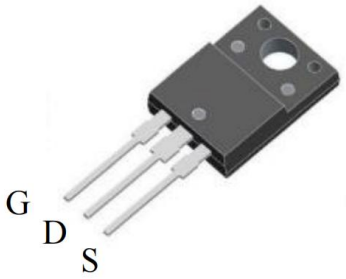
- Optimized for synchronous rectification
- Low Input Capacitance
- Low Miller Capacitance
- Fully Characterized Capacitance and Avalanche
- Pb-free lead plating; RoHS compliant

Applications

- BLDC Motor drive applications
- Battery powered circuits
- Synchronous rectifier applications
- Resonant mode power supplies

Equivalent Circuit & Pining





TO-220F

Marking

See Marking Instructions.

Absolute Maximum Ratings(Ta=25℃)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current-Continuous Note1	Tc= 25℃	I_D	36	A
	Tc= 125℃		23.6	A
Drain Current-Pulsed Note2	Tc= 25℃	I_{DM}	108	A
Avalanche Current		I_{AS}	8.4	A
Single Pulse Avalanche Energy Note3		E_{AS}	705.6	mJ
Maximum Power Dissipation	Tc= 25℃	P_{tot}	31	W
Storage Temperature Range		T_{STG}	-55 to 150	℃
Operating Junction Temperature Range		T_J	-55 to 150	℃

Thermal Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient Note4	Steady State			80	℃/W
Thermal resistance, Junction-to-Case Note4	Steady State			4.0	℃/W

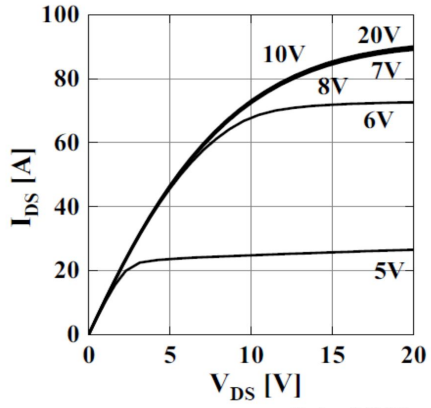
Electrical Characteristics(Ta=25℃)

STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Drain-Source Breakdown Voltage	V(BR)DSS	V_{GS}=0V, I_{DS}=250μA	650			V
Zero Gate Voltage Drain Current	IDSS	V_{DS}=650V, V_{GS}=0V, T_J=25°C			1	μA
		V_{DS}=650V, V_{GS}=0V, T_J=125°C			100	μA
Gate-Source Leakage Current	IGSS	V_{GS}=±30V, V_{DS}=0V			±100	nA
STATIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate Threshold Voltage	VGS(TH)	V_{DS}=V_{GS}, I_{DS}=250μA	2.5		3.5	V
Drain-Source On-State Resistance	RDS(ON)	V_{GS}=10V, I_{DS}=17A		88	95	mΩ
Gate Resistance	Rg	V_{GS}=0V, V_{DS}=0V, f=1MHz		2.3		Ω
DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	Ciss	V_{DS}=100V, V_{GS}=0V, f=100kHz		2766		pF
Output Capacitance	Coss	V_{DS}=100V, V_{GS}=0V, f=100kHz		100.2		pF
Reverse Transfer Capacitance	Crss	V_{DS}=100V, V_{GS}=0V, f=100kHz		1.5		pF
Turn-On Delay Time	Td(on)	V_{DS}=400V,V_{GS}=18V, I_{DS}=17A, R_G=3Ω		23.3		ns
Rise Time	tr	V_{DS}=400V, V_{GS}=18V, I_{DS}=17A, R_G=3Ω		56.9		ns
Turn-Off Delay Time	Td(off)	V_{DS}=400V, V_{GS}=18V, I_{DS}=17A, R_G=3Ω		74.2		ns
Fall Time	tf	V_{DS}=400V, V_{GS}=18V, I_{DS}=17A, R_G=3Ω		16.6		ns
GATE CHARGE CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate to Source Gate Charge	Qgs	V_{GS}= 0 to 10V, V_{DD}=400V, I_D=17A		9.8		nC
Gate to Drain Charge	Qgd	V_{GS}= 0 to 10V, V_{DD}=400V, I_D=17A		20.3		nC
Gate Charge Total	QG	V_{GS}= 0 to 10V, V_{DD}=400V, I_D=17A		64.1		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Diode Forward Voltage	VSD	VGS=0V, IF=17A		0.82	1.08	V
Body Diode Reverse Recovery Time	trr	VDD=480V, IF=17A, di/dt=100A/μs		341.4	-	ns
Body Diode Reverse Recovery Charge	Qrr	VDD=480V, IF=17A, di/dt=100A/μs		5.8	-	μC
Reverse Recovery Current	IRRM	VDD=480V, IF=17A, di/dt=100A/μs		33.8		A

Notes:
1. The maximum current rating is package limited.
2. Pulse Test: Pulse Width ≤ 10μs.
3. Starting TJ=25°C, L=20mH, VD=50V, VGS=10V.
4. For surface-mounted devices, both RthJC and RthJACare measured with the device mounted on approximately 1”×1”FR-4 PCBs. In actual applications, many factors including the PCB material and layout, may affect the thermal resistance of the device-board assembly. For best results, characterize the thermal resistance directly in the application circuit.

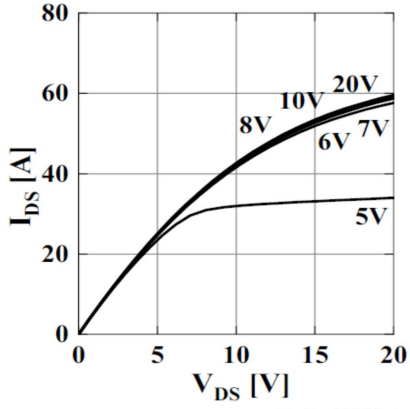
Typical Operating Characteristics

TYP.Output Characteristics T=25°C



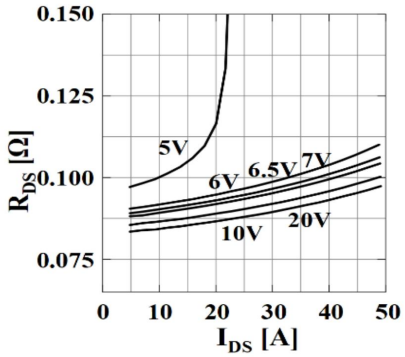
Pulse Width=200μs

TYP.Output Characteristics T=125°C

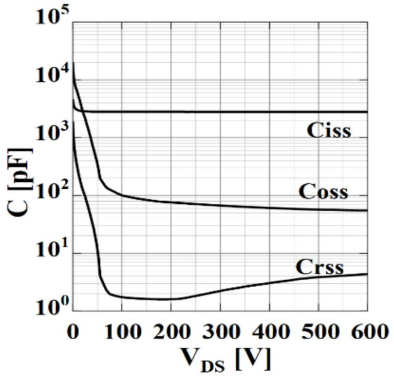


Pulse Width=200μs

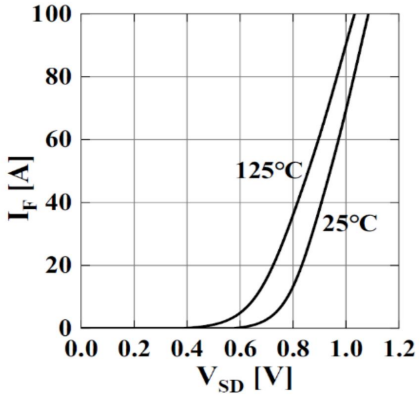
TYP.Drain-Source On-Resistance vs Drain Current



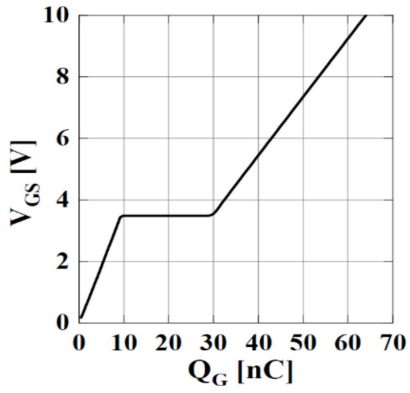
TYP.Capacitances



TYP.Body Diode Characteristics

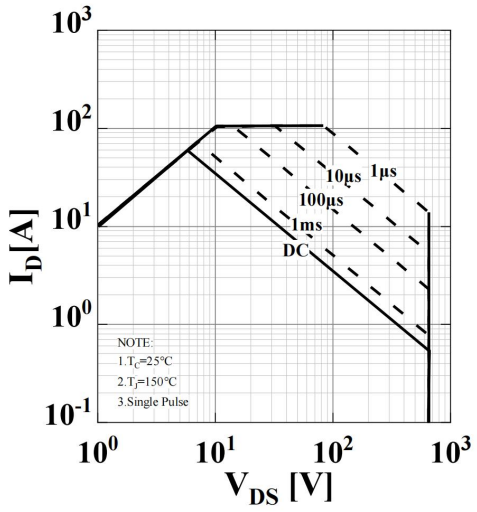


TYP.Gate Charge

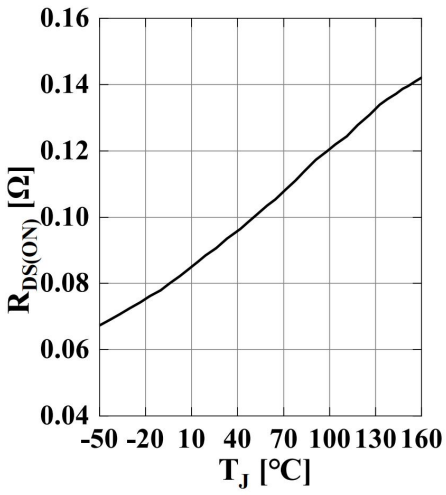


Typical Operating Characteristics

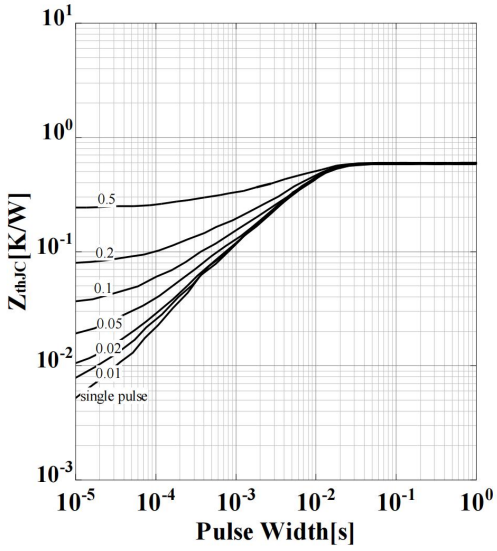
TYP.Safe Operating Area



TYP.$R_{DS(ON)}$ vs Junction Temperature



TYP.Transient Thermal Impedance



Marking codes

Note:

COT: Company Code

65R095: Product Type.

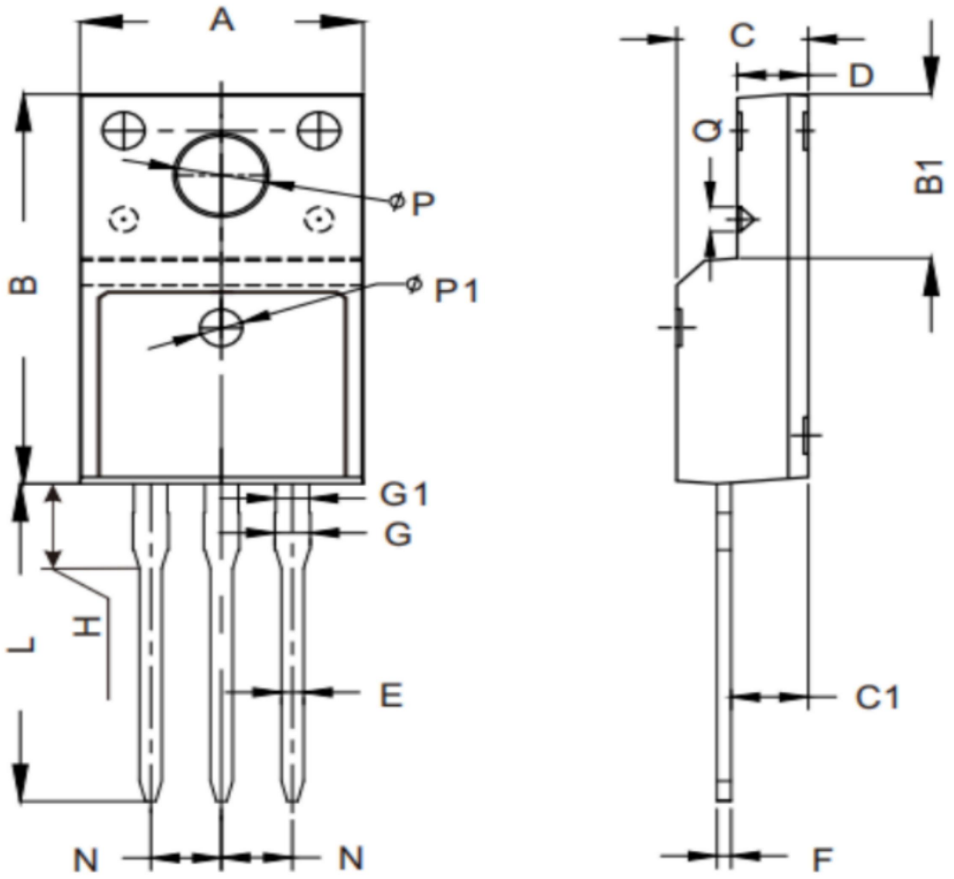
******: *: Inner Code * : Year Code **: Week Code **: Lot Code.

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing
CT65R095FA	Halogen-Free	TO-220F	FA	Tube

Mechanical Dimensions

TO-220F



Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	9.60	10.4	G	1.12	1.42
B	15.4	16.2	G1	1.10	1.40
B1	6.30	6.90	H	3.40	3.80
C	4.30	4.90	L	12.0	14.0
C1	2.56	2.96	N	2.34	2.74
D	2.40	2.90	ØP	3.00	3.30
E	0.60	1.00	ØP1	1.35	1.75
F	0.30	0.60	Q	0.80	1.20