

Descriptions

This is N-CHANNEL 650V 16.8A Super-Junction Power MOSFET in a TO-263/TO-220F/TO-220C Plastic Package

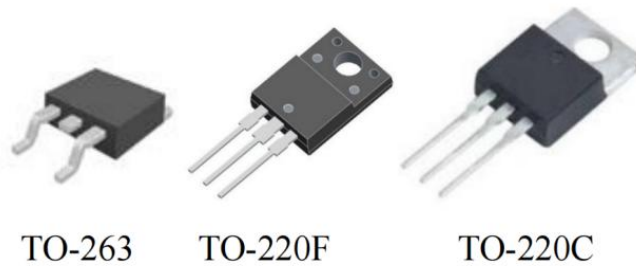
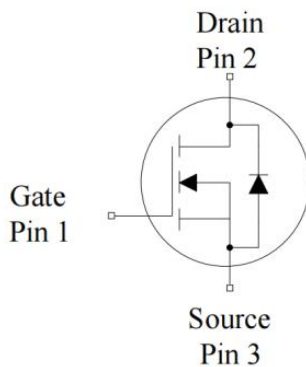
Features

- 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



Marking

See Marking Instructions.

Absolute Maximum Ratings(Ta=25°C)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		VDS	650	V
Gate-Source Voltage		VGS	±30	V
Drain Current-Continuous Note4	TC= 25°C	ID	16.8	A
	TC= 125°C		10.8	A
Drain Current-Pulsed Note1	TC= 25°C	IDM	50.4	A
Avalanche Current		IAR	7	A
Single Pulse Avalanche Energy Note3		EAS	490	mJ
Maximum Power Dissipation(CB/FA/CD)	TC= 25°C	Ptot	139/30/139	W
Storage Temperature Range		TSTG	-55 to 150	°C
Operating Junction Temperature Range		TJ	-55 to 150	°C

Thermal Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient(CB) Note2	Steady State			62	°C/W
Thermal resistance, Junction-to-Case(CB)	Steady State			0.9	°C/W
Thermal resistance, Junction-to-Ambient(FA) Note2	Steady State			80	°C/W
Thermal resistance, Junction-to-Case(FA)	Steady State			4.1	°C/W
Thermal resistance, Junction-to-Ambient(CD) Note2	Steady State			62	°C/W
Thermal resistance, Junction-to-Case(CD)	Steady State			0.9	°C/W

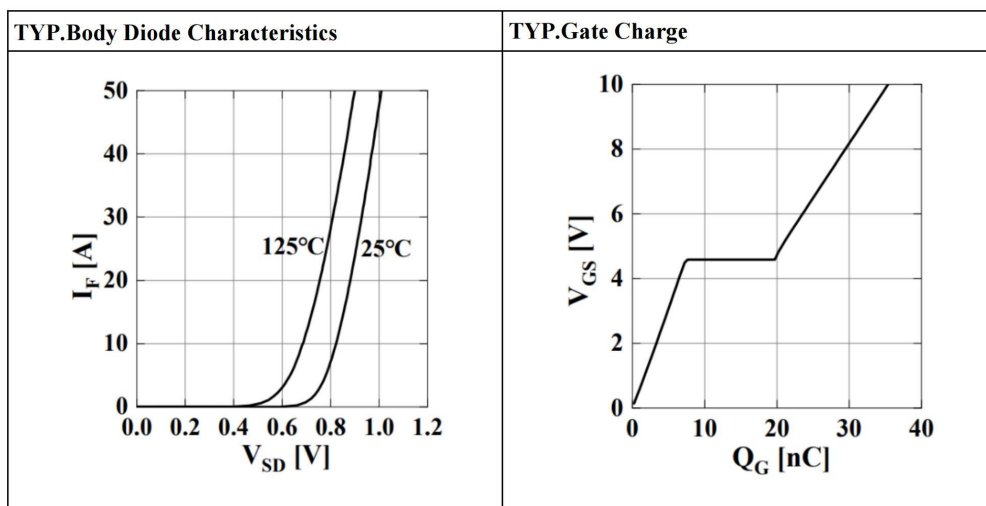
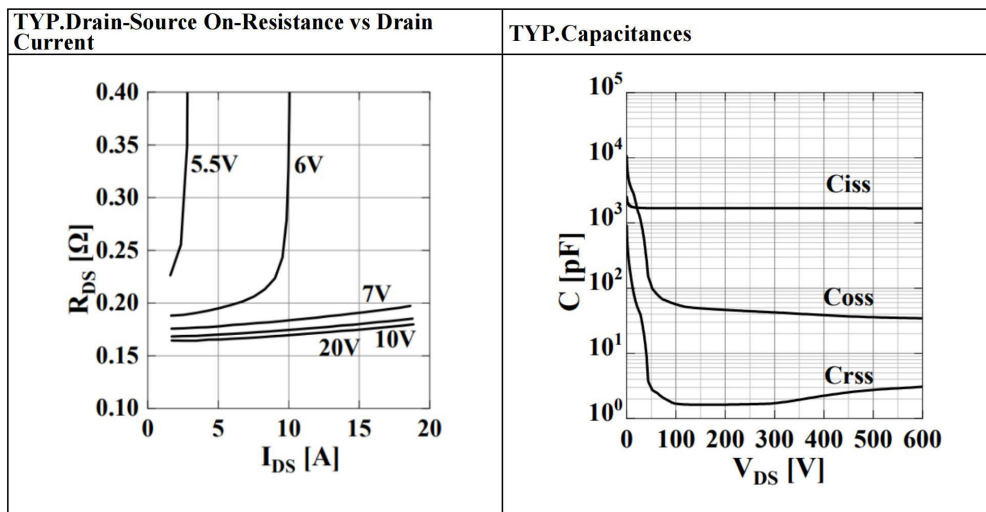
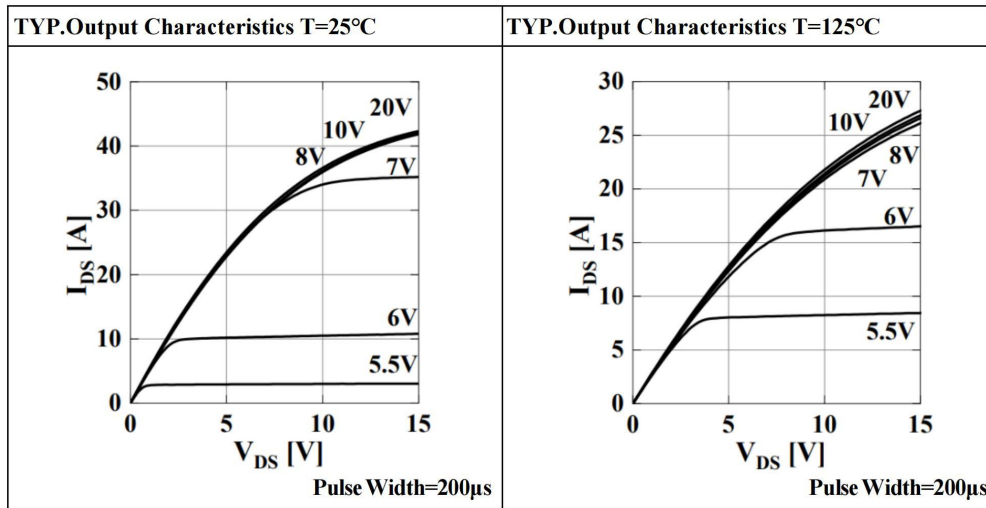
Electrical Characteristics(Ta=25°C)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V(BR)DSS	VGS=0V, IDS=250μA	650			V
Zero Gate Voltage Drain Current	IDSS	VDS=650V, VGS=0V, TJ=25°C			1	μA
		VDS=650V, VGS=0V, TJ=125°C			100	μA
Gate-Source Leakage Current	IGSS	VGS=±30V, VDS=0V			±100	nA
STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	VGS(TH)	VDS=VGS, IDS=250μA	3.5		4.5	V
Drain-Source On-State Resistance	RDS(ON)	VGS=10V, IDS=9.8A		170	190	mΩ
Gate Resistance	Rg	VGS=0V, VDS=0V, f=1MHz		3.6		Ω
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	Ciss	VDS=100V, VGS=0V, f=100kHz		1688		pF
Output Capacitance	Coss	VDS=100V, VGS=0V, f=100kHz		57.3		pF
Reverse Transfer Capacitance	Crss	VDS=100V, VGS=0V, f=100kHz		1.6		pF
Turn-On Delay Time	Td(on)	VDS=400V, VGS=18V, IDS=9.8A, RG=3Ω		20.8		ns
Rise Time	tr	VDS=400V, VGS=18V, IDS=9.8A, RG=3Ω		55		ns
Turn-Off Delay Time	Td(off)	VDS=400V, VGS=18V, IDS=9.8A, RG=3Ω		44.8		ns
Fall Time	tf	VDS=400V, VGS=18V, IDS=9.8A, RG=3Ω		16.6		ns
GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Qgs	VGS= 0 to 10V, VDD=400V, ID=5.1A		8		nC
Gate to Drain Charge	Qgd	VGS= 0 to 10V, VDD=400V, ID=5.1A		12		nC
Gate Charge Total	QG	VGS= 0 to 10V, VDD=400V, ID=5.1A		35.7		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	VSD	VGS=0V, IF=5.1A		0.82	1.08	V
Body Diode Reverse Recovery Time	trr	VDD=400V, IF=5.1A, di/dt=100A/μs		265.2		ns
Body Diode Reverse Recovery Charge	Qrr	VDD=400V, IF=5.1A, di/dt=100A/μs		4.3		μC
Reverse Recovery Current	IRRM	VDD=400V, IF=5.1A, di/dt=100A/μs		32.4		A

Notes:

- The maximum current rating is package limited.
- Pulse Test: Pulse Width ≤ 10μs.
- Starting TJ=25°C, L=20mH, VD=50V, VGS=10V.
- For surface-mounted devices, both RthJC and RthJA are 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



Marking codes



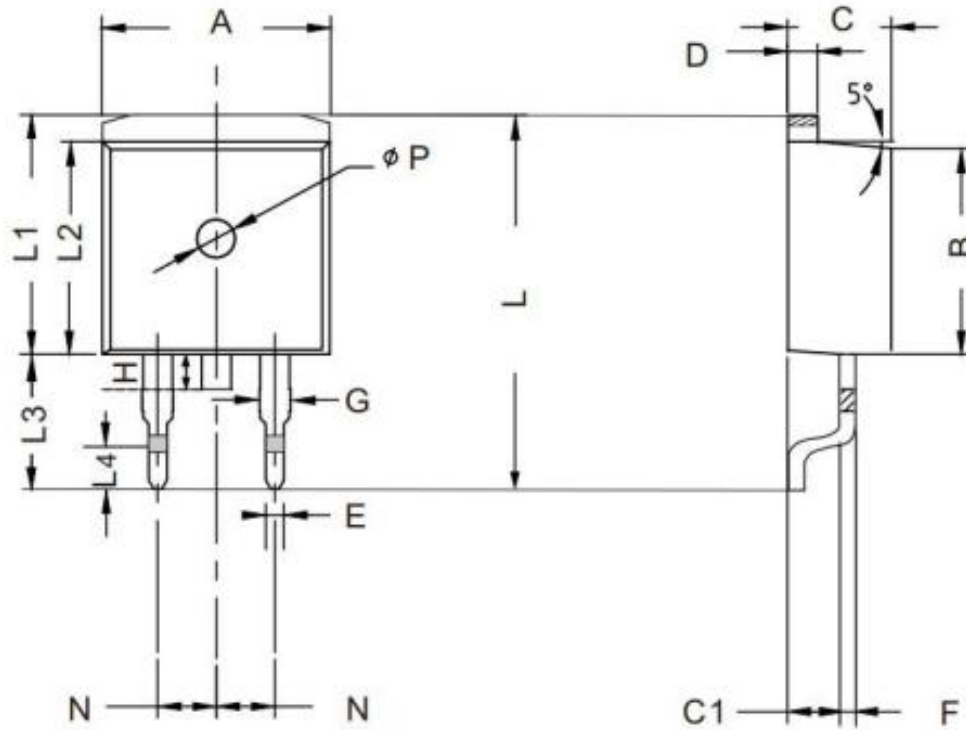
Note:

COT: Company Code
 65R190: Product Type.
 *****: *: Inner Code * : Year Code **: Week Code **: Lot Code.

Ordering Information

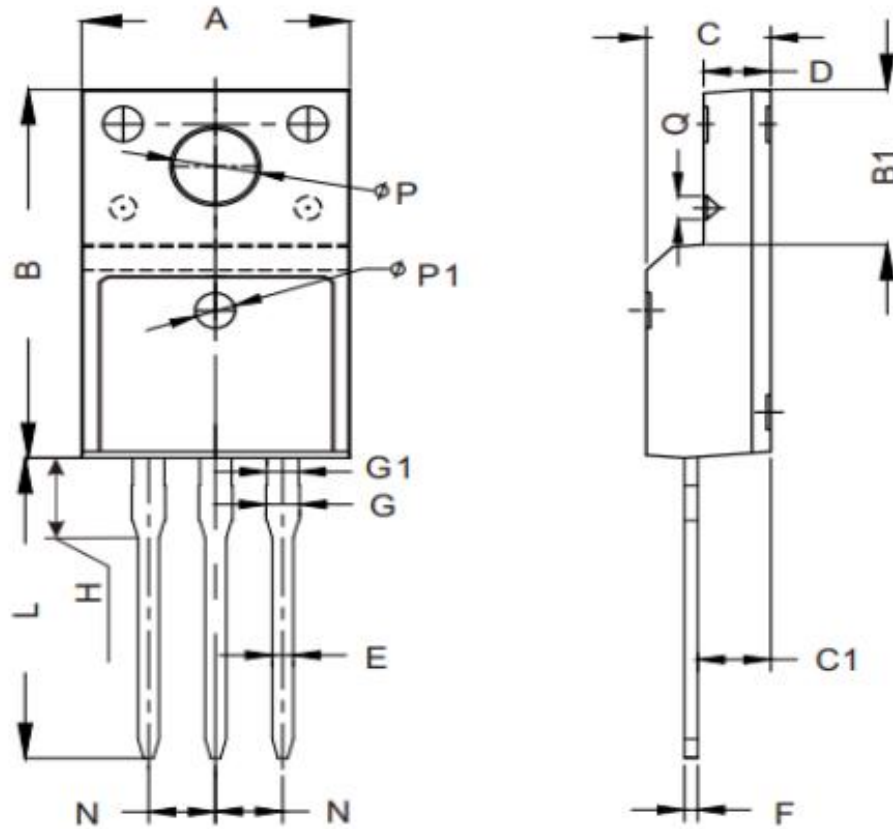
Ordering Code	RoHS Status	Package	Package Code	Packing
CT65R190CB	Halogen-Free	TO-263	CB	Tube
CT65R190FA	Halogen-Free	TO-220F	FA	Tube
CT65R190CD	Halogen-Free	TO-220C	CD	Tube

Mechanical Dimensions for TO-263



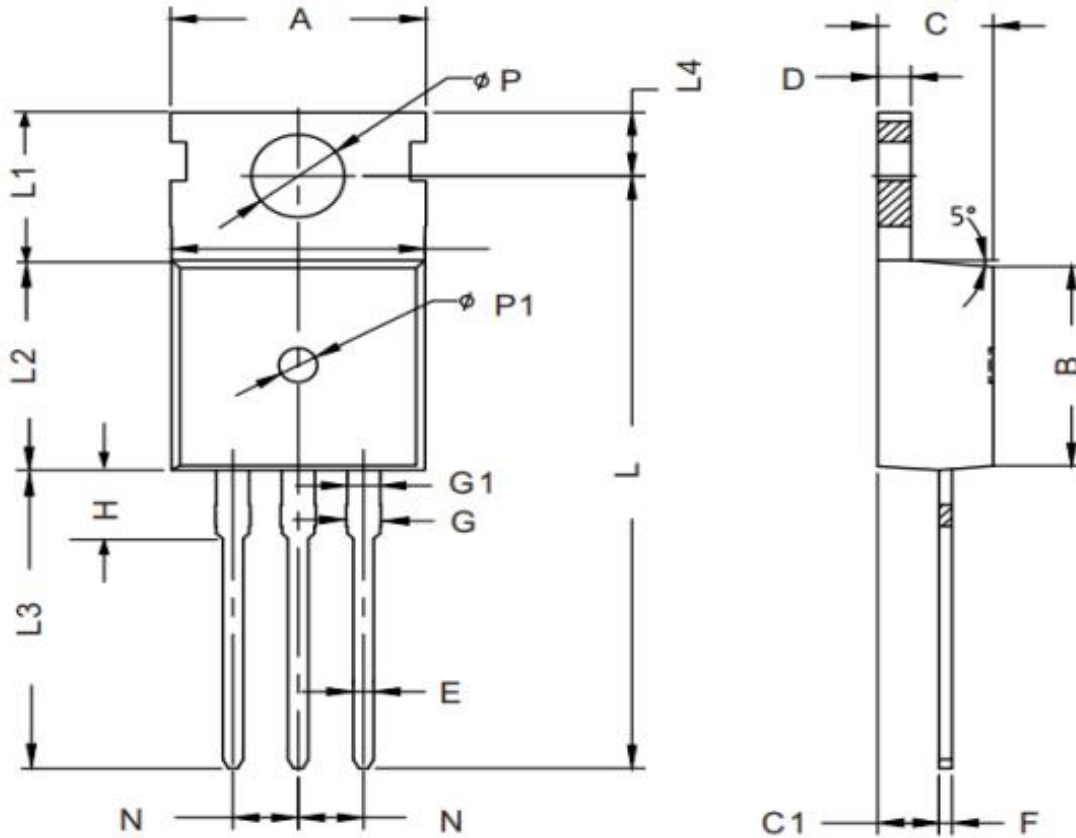
Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	9.60	10.30	H	1.45	1.75
B	8.40	9.00	L	14.60	15.00
C1	2.20	2.60	L1	10.00	11.00
C	4.30	4.70	L2	9.00	9.40
D	1.20	1.40	L3	4.10	4.50
E	0.70	0.90	L4	1.70	2.10
F	0.40	0.60	N	2.50	2.58
G	1.20	1.50	ØP	1.40	1.60

Mechanical Dimensions for 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

Mechanical Dimensions for TO-220C



Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	9.60	10.3	H	2.70	3.30
B	8.40	9.00	L	25.90	26.50
C1	2.20	2.60	L1	6.30	6.70
C	4.30	4.70	L2	9.00	9.40
D	1.20	1.40	L3	12.50	14.10
E	0.70	0.90	L4	2.70	2.90
F	0.40	0.60	N	2.50	2.58
G	1.20	1.50	ØP	3.50	3.70
G1	1.10	1.40	ØP1	1.40	1.60