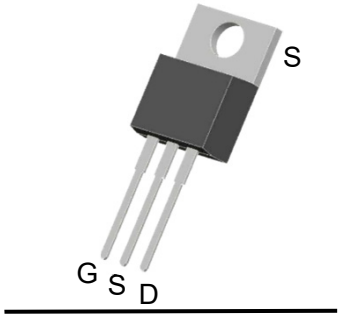
Prisemi®

PGCTO65R110A

650V Enhancement-mode GaN Transistor

Description

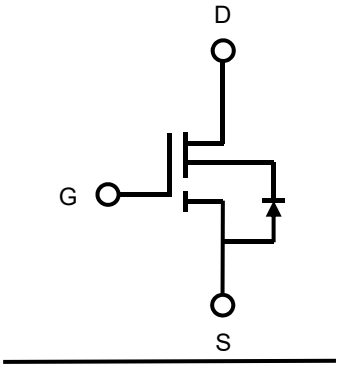
650V Normally-OFF GaN			
V_{DS}(V)	$R_{DS(on)}$(mΩ)	I_{DS}(A)	Q_G(nC)
650	110	20	7.2



TO-220 (Top View)

Feature

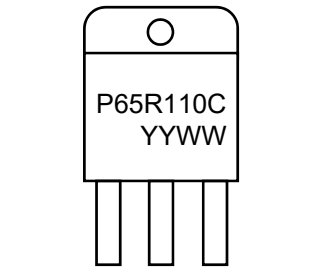
- Normally-off device combines high voltage GaN HEMT and low voltage silicon MOSFET
- Normally off power switch
- Low reverse-recovery charge
- High switching frequency
- Low gate charge, low output charge
- Qualified for industrial applications according to JEDEC Standards
- Package:TO-220



Circuit Diagram

Applications

- Fast charger
- Renewable energy
- Telecom and data-com
- Servo motors
- Industrial
- Automotive



Marking (Top View)

Absolute maximum rating@25℃

Rating		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	650	V
Drain-Source Voltage-transient[1)]		$V_{DS(transient)}$	900	V
Gate-Source Voltage		V_{GS}	-20 to +20	V
Drain Current-Continuous[2)]	T_C =25℃	I_D	20	A
	T_C =125℃		9.0	A
Pulse Drain Current (pulse width: 100μs)		I_{DM}	75	A
Maximum Power Dissipation		P_D	96	W
Junction and Storage Temperature Range		T_J,T_{STG}	-55~+150	℃

Notes:
1. In off-state, spike duty cycle D<0.01, spike duration <1μs
2. For increased stability at high current operation.

Thermal characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance, Junction - Case	$R_{\theta JC}$	-	1.3	-	℃/W

Electrical characteristics per line@25℃ (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V	650	-	-	V
Total Drain Leakage Current	I_{DSS}	V_{DS}= 650V,V_{GS}= 0V	-	-	10	μA
		V_{DS}= 650V,V_{GS}= 0V, T_J=150℃	-	-	100	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D= 1mA	1.0	1.9	3.0	V
Gate Threshold Voltage Temperature Coefficient	$\triangle V_{GS(th)}/T_J$		-	-7	-	mV/℃
Gate-Source Leakage Current	I_{GSS}	V_{GS}= ±20V	-	-	±100	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}= 10V, I_D= 1A	-	110	140	mΩ
		V_{GS}= 10V, I_D= 1A, T_J=150℃	-	230	-	
Input Capacitance	C_{iss}	V_{DS}= 400V,V_{GS}= 0V, f= 1MHz	-	243	-	pF
Output Capacitance	C_{oss}		-	34	-	
Reverse Transfer Capacitance	C_{rss}		-	1.5	-	
Output Charge	Q_{oss}	V_{GS} =0V, V_{DS} =0V to 400V	-	46	-	nC
Total Gate Charge	Q_g	V_{GS}=0 to 10V, V_{DS}=400V, I_D=1A	-	7.2	-	nC
Gate-Source Charge	Q_{gs}		-	2.3	-	
Gate-Drain Charge	Q_{gd}		-	2.9	-	
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=400V, V_{GS}=0V to 10V, I_D=2.1A, $R_{G-on(ext)}$=6.8Ω, $R_{G-off(ext)}$=2.2Ω, L=250μH	-	6.0	-	ns
Turn-on Rise Time	t_r		-	17	-	
Turn-Off Delay Time	$t_{d(off)}$		-	7.0	-	
Turn-Off Fall Time	t_f		-	15	-	
Reverse Device Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}= 0V,I_{SD}= 10A	-	2.5	-	V
Reverse Recovery Time	t_{rr}	I_F=10A, V_{DD}=400V, dI_F/dt=165A/μs	-	14	-	ns
Reverse Recovery Charge	Q_{rr}		-	6.5	-	nC

Typical Characteristics

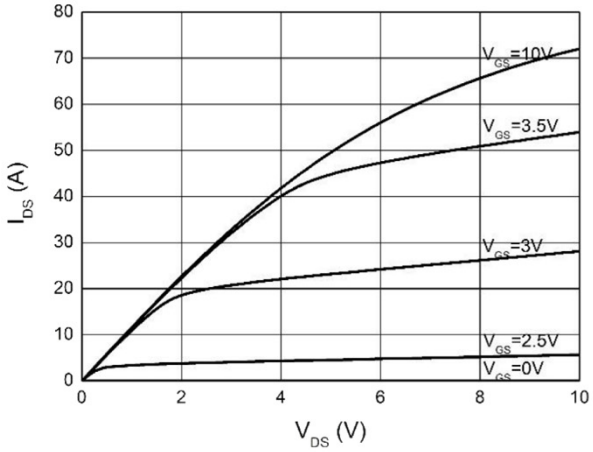


Figure 1. Typical Output Characteristics T_J=25°C

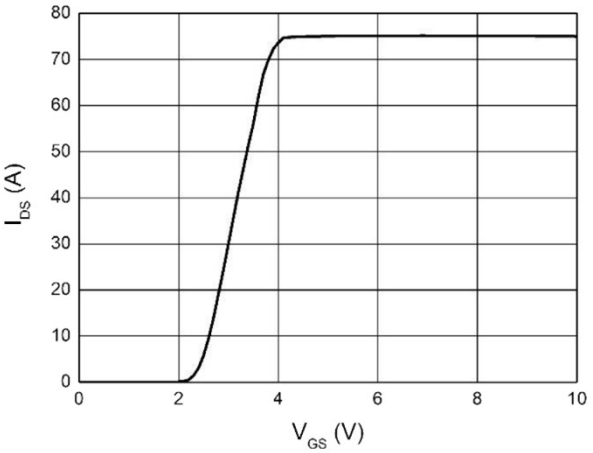


Figure 2. Typical Transfer Characteristics T_J=25°C (V_{DS}=10V)

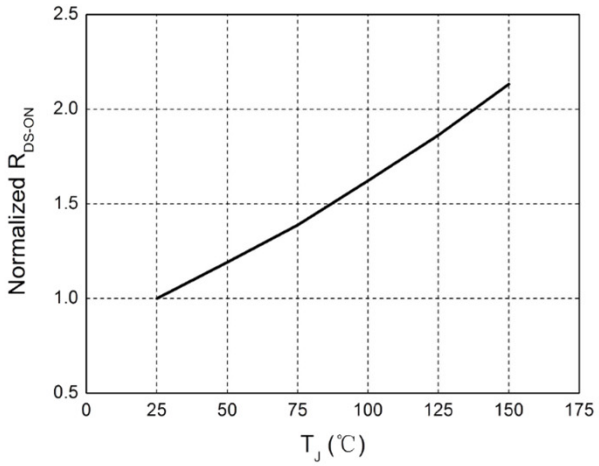


Figure 3. Normalized On-resistance

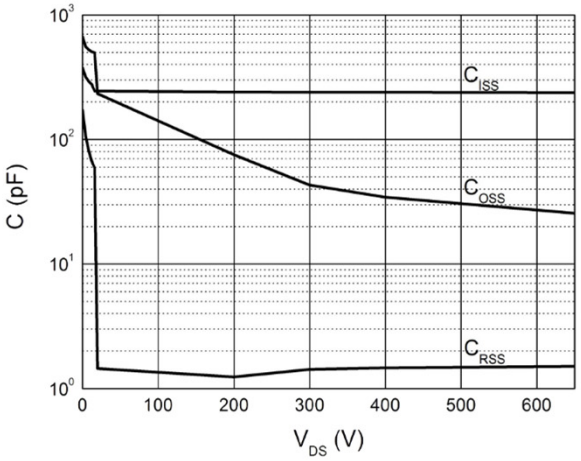


Figure 4. Typical Capacitance (f=1MHz)

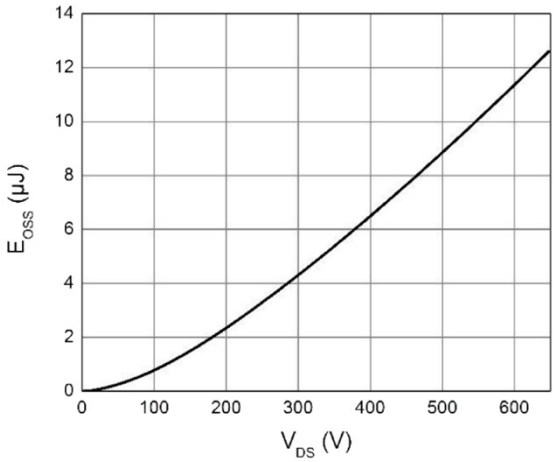


Figure 5. Typical C_{OSS} Stored Energy

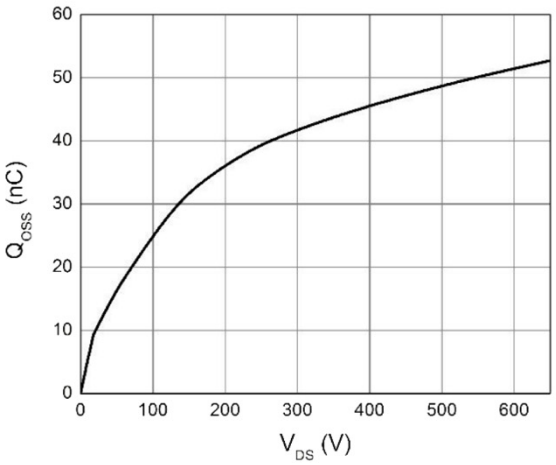


Figure 6. Typical Q_{OSS}

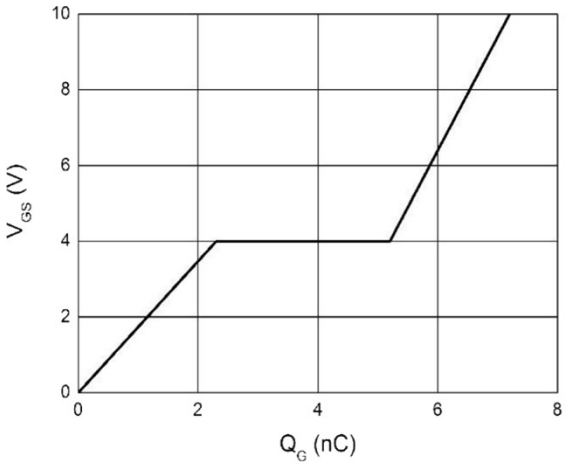


Figure 7. Typical Gate Charge (V_{DS}=400V, I_D=1A)

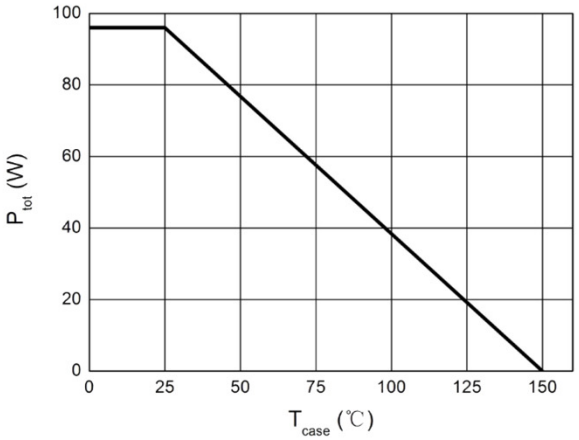


Figure 8. Power Dissipation

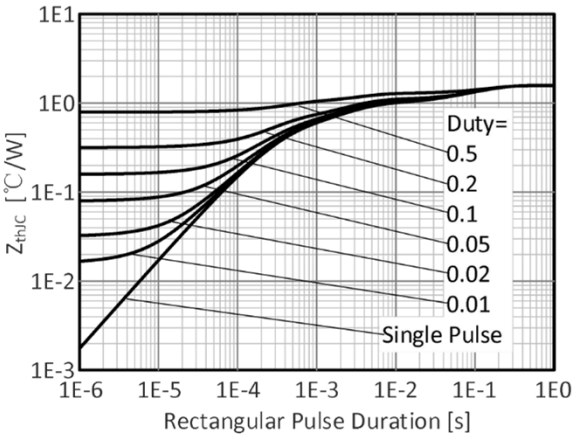


Figure 9. Transient Thermal Resistance

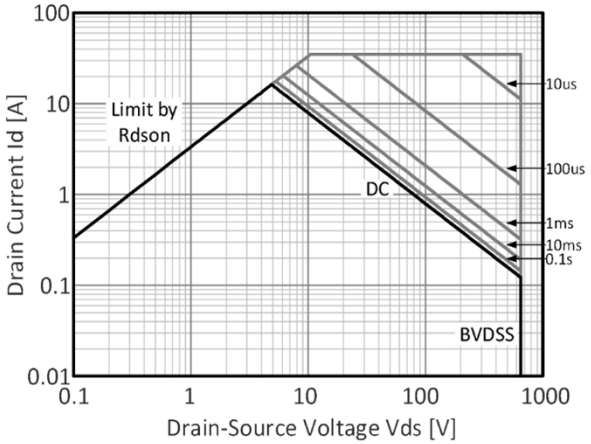


Figure 10. Safe Operating Area T_C=25°C

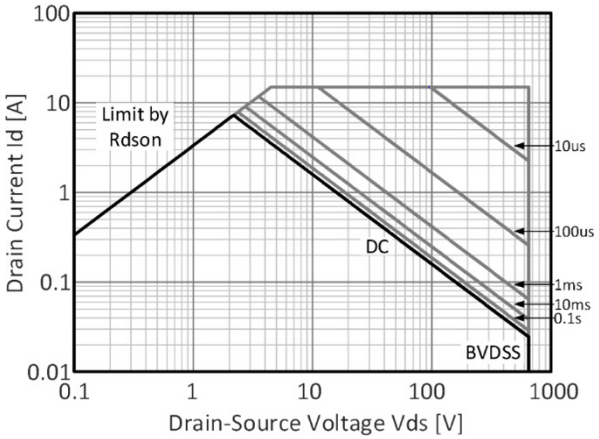
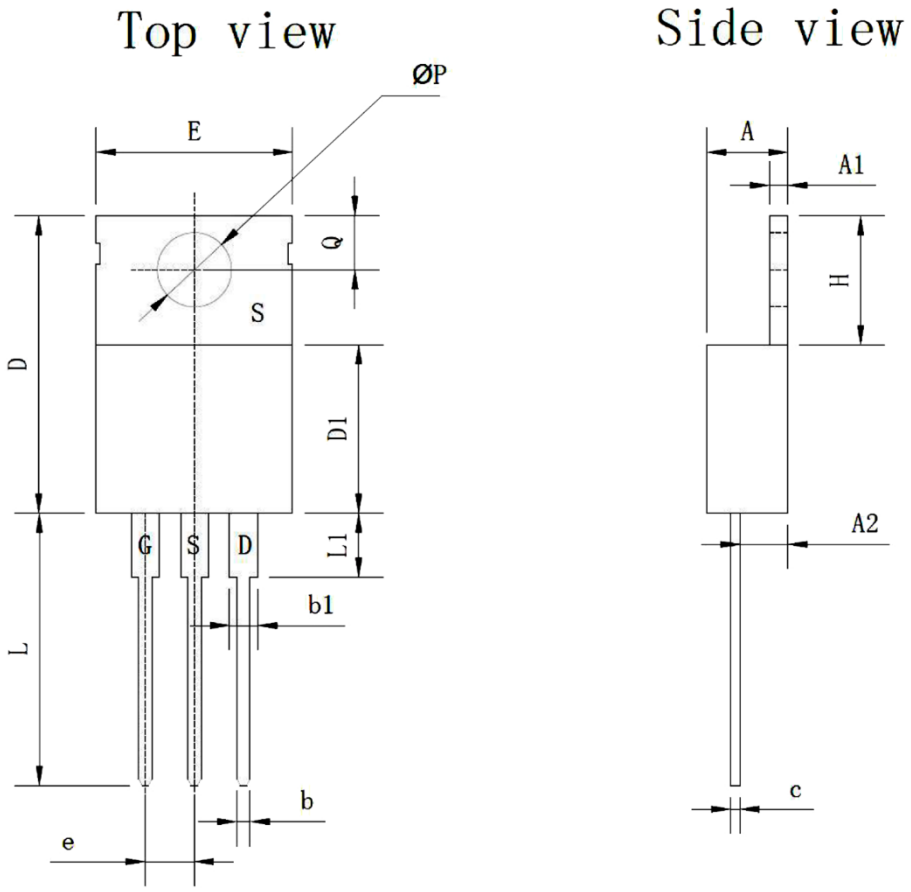


Figure 11. Safe Operating Area T_C=125°C

Product Dimension (TO-220)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	3.556	4.826	0.140	0.190	b	0.381	1.016	0.015	0.040
A1	0.508	1.397	0.020	0.055	b1	1.143	1.778	0.045	0.070
A2	2.032	2.921	0.080	0.115	D	14.224	16.510	0.560	0.650
c	0.356	0.610	0.014	0.024	D1	8.382	9.017	0.330	0.355
H	5.842	6.858	0.230	0.270	Q	2.54	3.048	0.100	0.120
E	9.652	10.668	0.380	0.420	L	12.70	14.732	0.500	0.580
φP	3.81	3.86	0.150	0.152	L1	-	6.35	-	0.250
e	2.54 BSC.		0.100 BSC.						

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