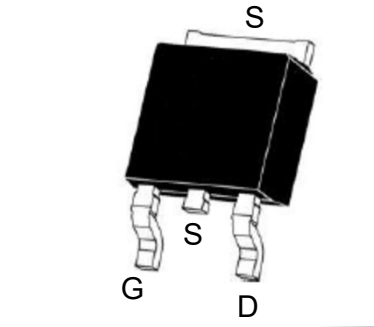
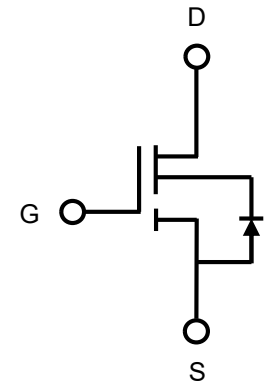
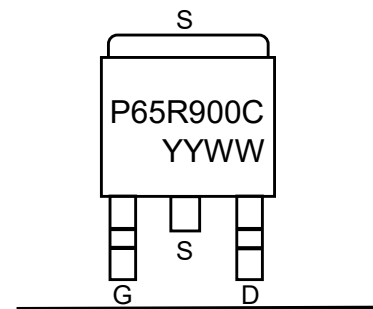


650V Enhancement-mode GaN Transistor

Description

650V Normally-OFF GaN			
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)$	$I_{DS}(A)$	$Q_G(nC)$
650	900	3.6	7.9


TO-252 (Top View)

Circuit Diagram

Marking (Top View)

Feature

- Easy to drive compatible with standard gate
- Low conduction and switching losses
- RoHS compliant and Halogen
- Package: TO-252

Applications

- Adapter
- Renewable energy
- Telecom and data-com
- Servo motors
- Industrial
- Automotive

Absolute maximum rating@25°C

Rating		Symbol	Value	Units
Drain-Source Voltage		V_{DS}	650	V
Drain-Source Voltage-transient ¹⁾		$V_{DS(transient)}$	800	V
Gate-Source Voltage		V_{GS}	-20 to +20	V
Drain Current-Continuous ²⁾	$T_C = 25^\circ C$	I_D	3.6	A
	$T_C = 125^\circ C$		1.6	A
Pulse Drain Current (pulse width: 100μs)		I_{DM}	5	A
Maximum Power Dissipation		P_D	21	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55~+150	°C

Notes:

1. In off-state, spike duty cycle $D < 0.01$, spike duration $< 1\mu s$
2. For increased stability at high current operation.

Thermal characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units
Thermal Resistance, Junction - Case	$R_{\theta JC}$	-	6.0	-	$^{\circ}\text{C}/\text{W}$

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0\text{V}$	650	-	-	V
Total Drain Leakage Current	I_{DSS}	$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_J=25^{\circ}\text{C}$	-	-	10	μA
		$V_{DS}=650\text{V}, V_{GS}=0\text{V}, T_J=150^{\circ}\text{C}$	-	-	100	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_{DS}=1\text{mA}$	3.3	4.0	4.8	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(th)}/T_J$		-	-7	-	$\text{mV}/^{\circ}\text{C}$
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{V}$	-	-	± 100	nA
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=1\text{A}, T_J=25^{\circ}\text{C}$	-	900	1080	$\text{m}\Omega$
		$V_{GS}=10\text{V}, I_D=1\text{A}, T_J=150^{\circ}\text{C}$	-	1900	-	
Input Capacitance	C_{iss}	$V_{DS}=400\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$	-	293	-	pF
Output Capacitance	C_{oss}		-	17	-	
Reverse Transfer Capacitance	C_{rss}		-	3.74	-	
Output Charge	Q_{oss}	$V_{GS}=0\text{V}, V_{DS}=0\text{V to }400\text{V}, f=1\text{MHz}$	-	22.2	-	nC
Total Gate Charge	Q_g	$V_{GS}=0\text{ to }10\text{V}, V_{DS}=400\text{V}, I_D=1\text{A}$	-	7.9	-	nC
Gate-Source Charge	Q_{gs}		-	2.31	-	
Gate-Drain Charge	Q_{gd}		-	1.65	-	
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=400\text{V}, V_{GS}=0\text{V to }10\text{V}, I_D=2.1\text{A}, R_{G-on(ext)}=6.8\Omega, R_{G-off(ext)}=2.2\Omega, L=250\mu\text{H}$	-	3.2	-	ns
Turn-on Rise Time	t_r		-	5.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	7.4	-	
Turn-Off Fall Time	t_f		-	27	-	
Reverse Device Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0\text{V}, I_{SD}=2.5\text{A}$	-	2.2	-	V
Reverse Recovery Time	t_{rr}	$I_F=2.5\text{A}, V_{DD}=400\text{V}, di_F/dt=165\text{A}/\mu\text{s}$	-	14	-	ns
Reverse Recovery Charge	Q_{rr}		-	6.5	-	nC

Typical Characteristics

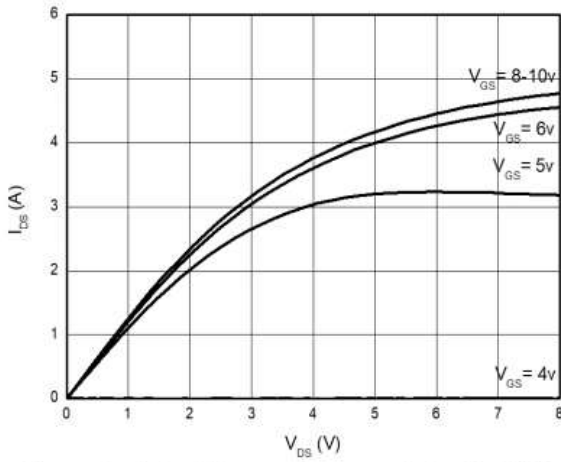


Figure 1. Typical Output Characteristics $T_j=25^\circ\text{C}$

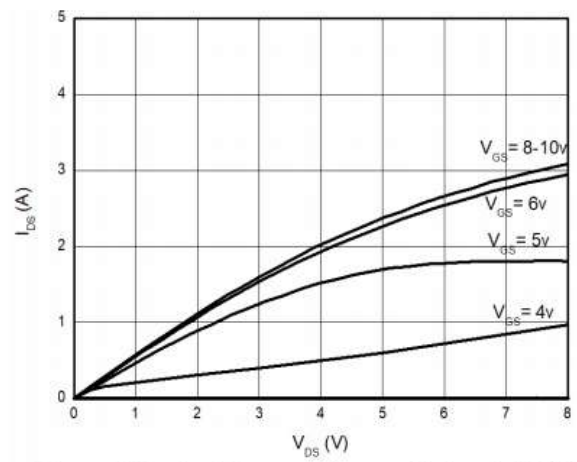


Figure 2. Typical Output Characteristics $T_j=125^\circ\text{C}$

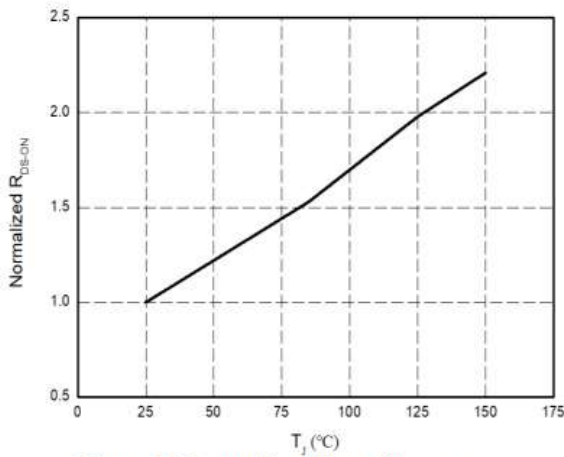


Figure 3. Normalized On-resistance

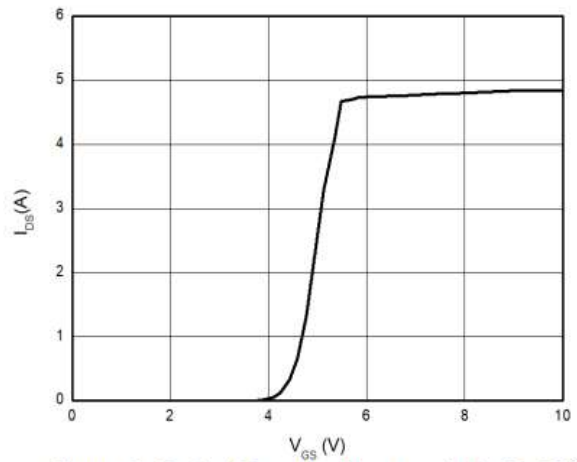


Figure 4. Typical Transfer Characteristics $T_j=25^\circ\text{C}$

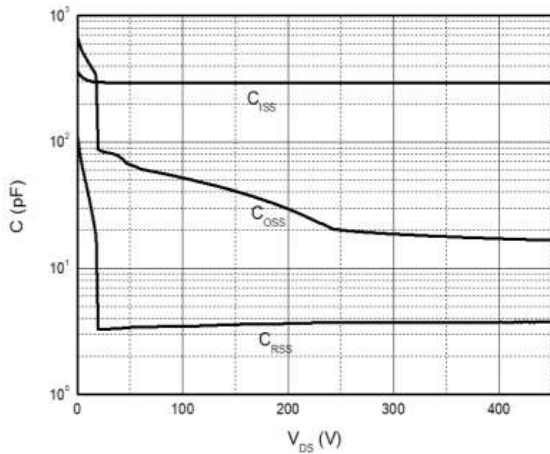


Figure 5. Typical Capacitance ($f=1\text{MHz}$)

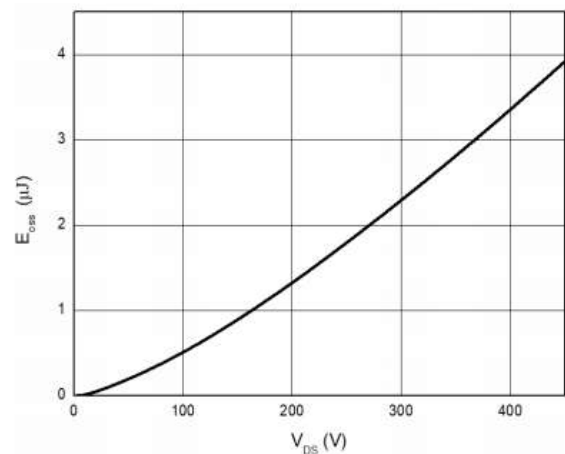


Figure 6. Typical C_{oss} Stored Energy

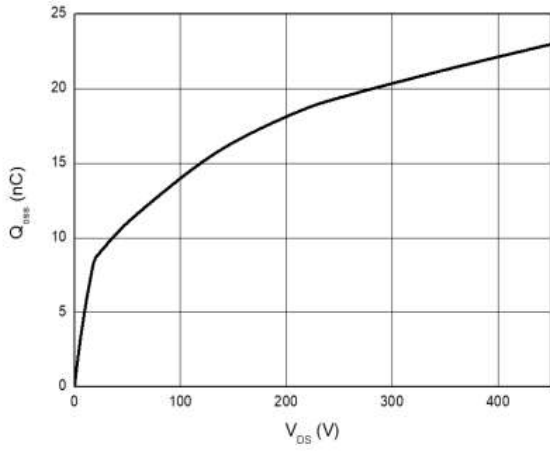


Figure 7. Typical Q_{oss}

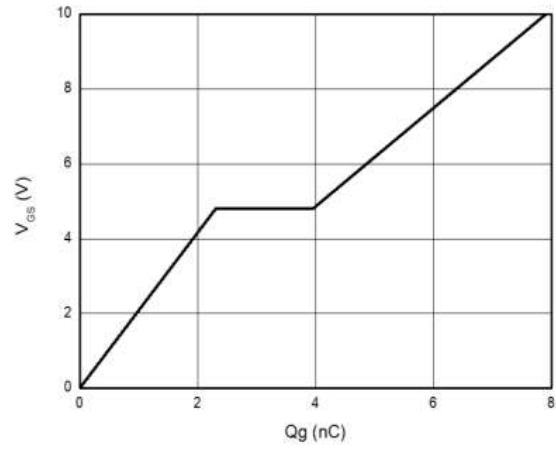


Figure 8. Typical Gate Charge ($V_{DS}=400V, I_D=1A$)

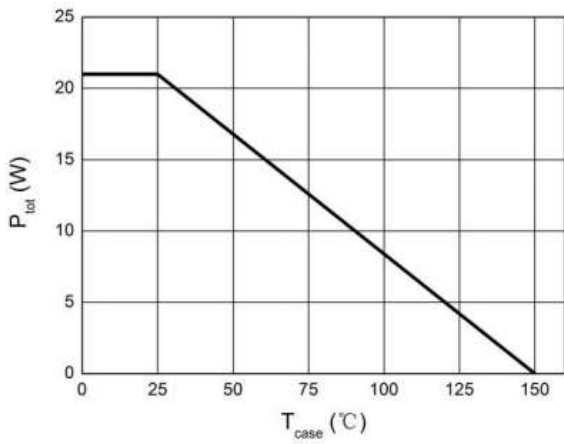
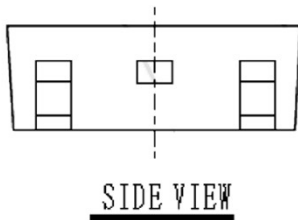
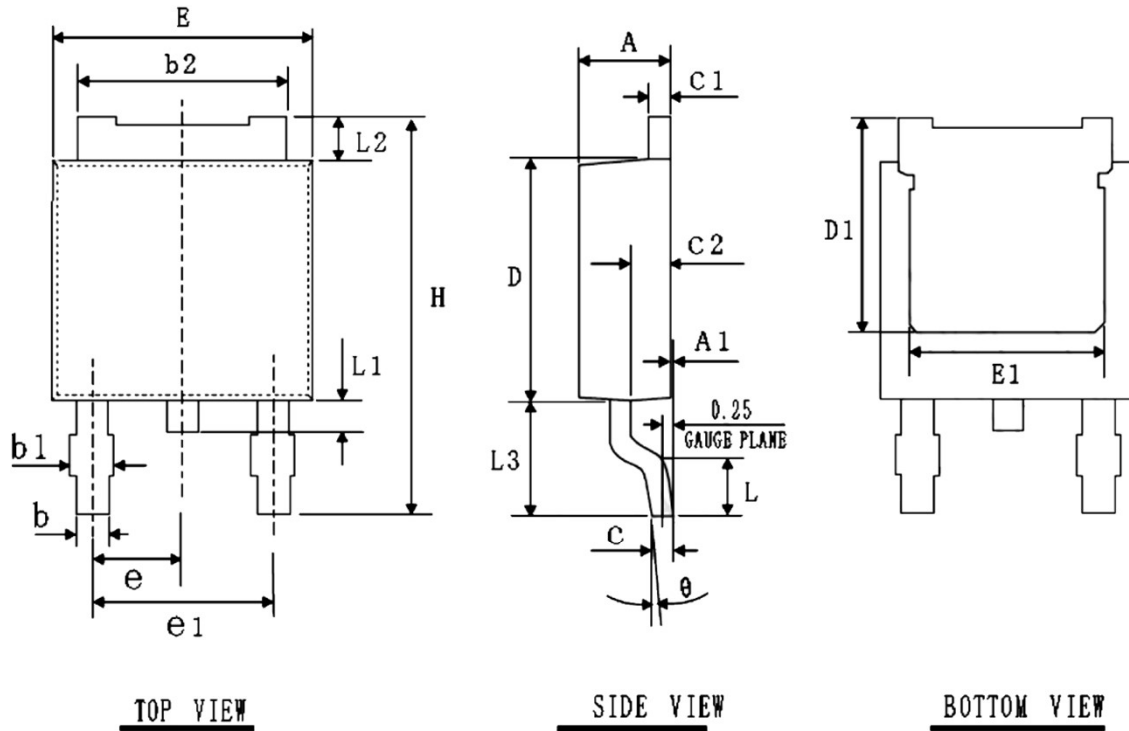



Figure 9. Power Dissipation

Product Dimension (TO-252)



SYMB OL	Millimeters			SYMB OL	Millimeters			SYMB OL	Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX		MIN	NOM	MAX
A	2.20	2.30	2.40	D1	5.25	5.45	5.65	θ	0°	4°	8°
A1	0.00	0.05	0.10	H	10.00	10.10	10.20	e 2.285 BSC			
b	0.762	0.812	0.862	E	6.50	6.60	6.70				
b 1	--	--	1.10	E1	4.75	4.85	4.95				
b2	5.23	5.33	5.43	e1	4.37	4.57	4.77				
C	0.458	0.508	0.558	L	--	--	1.45				
C1	0.458	0.508	0.558	L1	0.60	0.75	0.90				
C2	0.80	1.00	1.20	L2	0.90	1.10	1.30				
D	6.00	6.10	6.20	L3	2.80	3.00	3.20				


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