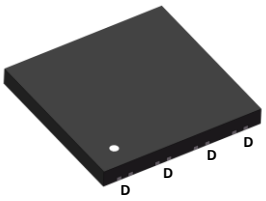
P/N:YZPST-RGN700C29D8

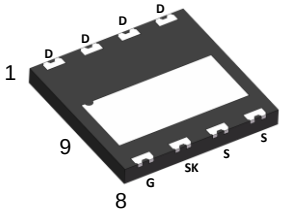
700V Super-GaN

700V 58A 80mΩ Super GaN in DFN8*8 Datasheet

Features

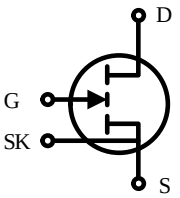
Enhancement mode transistor-Normally off power switch
Ultra high switching frequency
No reverse-recovery charge
Low gate charge, low output charge
Qualified for industrial applications according to JEDEC Standards
ESD safeguard
RoHS, Pb-free, REACH-compliant





Applications

AC-DC converters
DC-DC converters
BCM/DCM totem pole PFC
Fast battery charging
High density power conversion
High efficiency power conversion



Key performance parameters at T_j = 25 °C

Parameter	Value	Unit
$V_{DS,max}$	700	V
$R_{DS(on),max}$ @ V_{GS} = 6 V	80	mΩ
$Q_{G,typ}$ @ V_{DS} = 400 V	6.2	nC
$I_{D,pulse}$	58	A
Q_{OSS} @ V_{DS} = 400 V	60	nC
Q_{rr} @ V_{DS} = 400 V	0	nC

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Maximum ratings at T_j = 25 °C unless otherwise specified

Parameter	Symbol	Values	Unit	Note/Test Condition
Drain source voltage	$V_{DS,max}$	700	V	V_{GS} = 0 V, T_j = -55 °C to 150 °C
Drain source voltage transient [1]	$V_{DS,transient}$	800	V	V_{GS} = 0 V
Drain source voltage, pulsed [2]	$V_{DS,pulse}$	750	V	T_j = 25 °C; total time < 10 h
				T_j = 125 °C; total time < 1 h
Continuous current, drain source	I_D	29	A	T_c = 25 °C
Pulsed current, drain source [3]	$I_{D,pulse}$	58	A	T_c = 25 °C; V_{GS} = 6 V; t_{PULSE} = 10 µs
Pulsed current, drain source [3]	$I_{D,pulse}$	29	A	T_c = 125 °C; V_{GS} = 6 V; t_{PULSE} = 10 µs
Gate source voltage, continuous	V_{GS}	-6 to +7	V	T_j = -55 °C to 150 °C
Gate source voltage, pulsed	$V_{GS,pulse}$	-20 to +10	V	T_j = -55 °C to 150 °C; t_{PULSE} = 50 ns, f = 100 kHz; open drain
Power dissipation	P_{tot}	188	W	T_c = 25 °C
Operating temperature	T_j	-55 to +150	˚C	
Storage temperature	T_{stg}	-55 to +150	˚C	

Thermal characteristics

Parameter	Symbol	Values	Unit	Note/Test Condition
Thermal resistance, junction-ambient	R_{thJA}	33.6	°C/W	
Thermal resistance, junction-case	R_{thJC}	0.52	°C/W	
Maximum reflow soldering temperature	T_{sold}	260	°C	MSL3

Electric characteristics at T_j = 25 °C, unless specified otherwise

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Gate threshold voltage	$V_{GS(th)}$	1.2	1.7	2.5	V	I_D = 30.7 mA; V_{DS} = V_{GS}; T_j = 25 °C
		-	1.6	-		I_D = 30.7 mA; V_{DS} = V_{GS}; T_j = 150 °C
Drain-source leakage current	I_{DSS}	-	5	65	µA	V_{DS} = 700 V; V_{GS} = 0 V; T_j = 25 °C
		-	13	390		V_{DS} = 700 V; V_{GS} = 0 V; T_j = 150 °C
Gate-source leakage current	I_{GSS}	-	163	-	µA	V_{GS} = 6 V; V_{DS} = 0 V
Drain-source on-state resistance	$R_{DS(on)}$	-	60	80	mΩ	V_{GS} = 6 V; I_D = 8 A; T_j = 25 °C
		-	135	-	mΩ	V_{GS} = 6 V; I_D = 8 A; T_j = 150 °C
Gate resistance	R_G	-	3	-	Ω	f = 5 MHz; open drain

Dynamic characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Input capacitance	C_{iss}	-	225	-	pF	V_{GS} = 0 V; V_{DS} = 400 V; f = 100 kHz
Output capacitance	C_{oss}	-	70	-	pF	V_{GS} = 0 V; V_{DS} = 400 V; f = 100 kHz
Reverse transfer Capacitance	C_{rss}	-	0.5	-	pF	V_{GS} = 0 V; V_{DS} = 400 V; f = 100 kHz
Effective output capacitance, energy related [1]	$C_{o(er)}$	-	105	-	pF	V_{GS} = 0 V; V_{DS} = 0 to 400 V
Effective output capacitance, time related [2]	$C_{o(tr)}$	-	150	-	pF	V_{GS} = 0 V; V_{DS} = 0 to 400 V
Output charge	Q_{OSS}	-	60	-	nC	V_{GS} = 0 V; V_{DS} = 0 to 400 V
Turn-on delay time	$t_{d(on)}$	-	3	-	ns	V_{DS} = 400 V; I_D = 16 A; L = 318 µH; V_{GS} = 6 V; R_{on} = 10 Ω; R_{off} = 2 Ω; See Figure 22
Turn-off delay time	$t_{d(off)}$	-	5	-	ns	
Rise time	t_r	-	4	-	ns	
Fall time	t_f	-	4	-	ns	

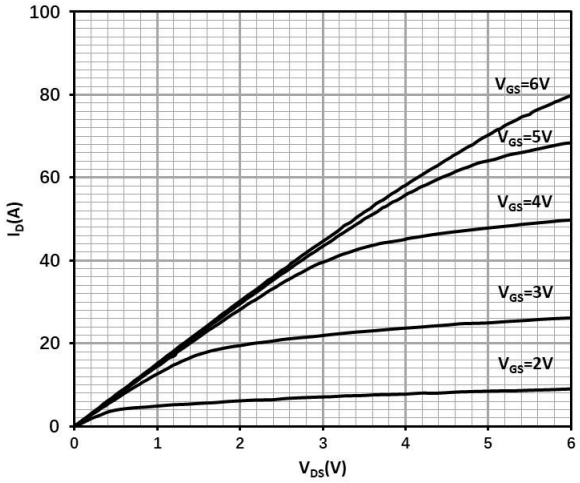
Gate charge characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Gate charge	Q_G	-	6.2	-	nC	V_{GS} = 0 to 6 V; V_{DS} = 400 V; I_D = 8 A
Gate-source charge	Q_{GS}	-	0.5	-	nC	
Gate-drain charge	Q_{GD}	-	2.2	-	nC	
Gate plateau Voltage	V_{Plat}	-	2.2	-	V	V_{DS} = 400 V; I_D = 8 A

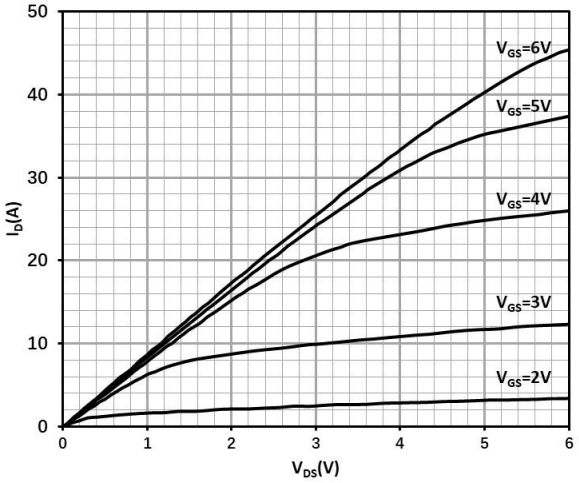
Reverse conduction characteristics

Parameter	Symbol	Values			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Source-drain reverse voltage	V_{SD}	-	2.3	-	V	V_{GS} = 0 V; I_S = 8 A
Pulsed current, reverse	$I_{S,pulse}$	-	-	58	A	V_{GS} = 6 V; t_{PULSE} = 10 µs
Reverse recovery charge	Q_{rr}	-	0	-	nC	I_S = 8 A; V_{DS} = 400 V
Reverse recovery time	t_{rr}	-	0	-	ns	
Peak reverse recovery current	I_{rrm}	-	0	-	A	

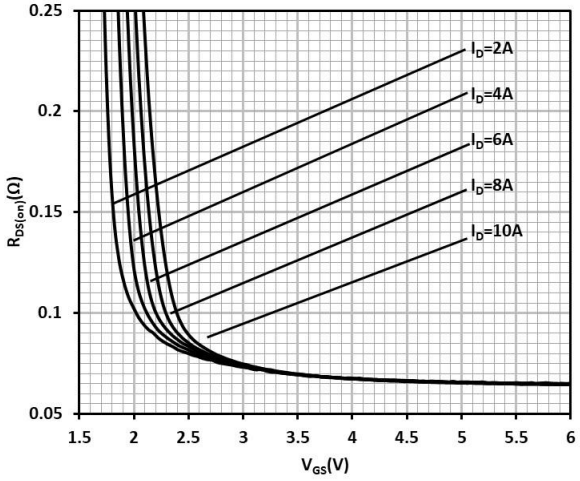
Electric characteristics diagrams at T_j = 25 °C, unless specified otherwise



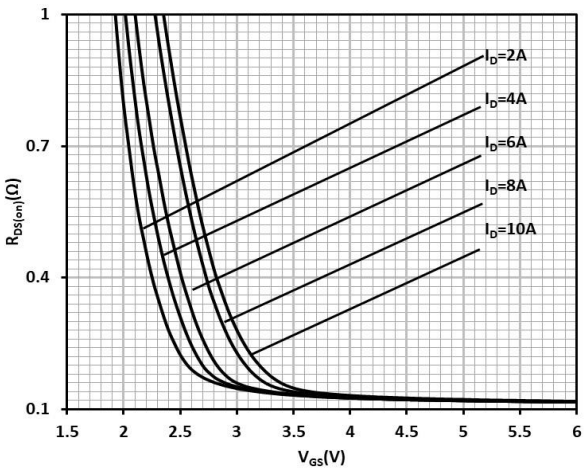
$I_D = f(V_{DS}, V_{GS})$; T_j = 25 °C



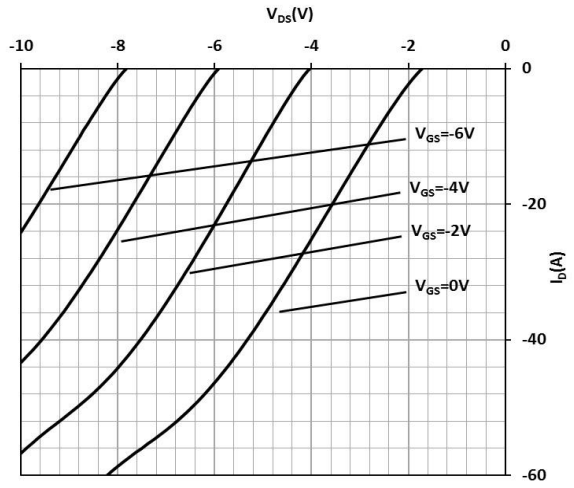
$I_D = f(V_{DS}, V_{GS})$; T_j = 125 °C



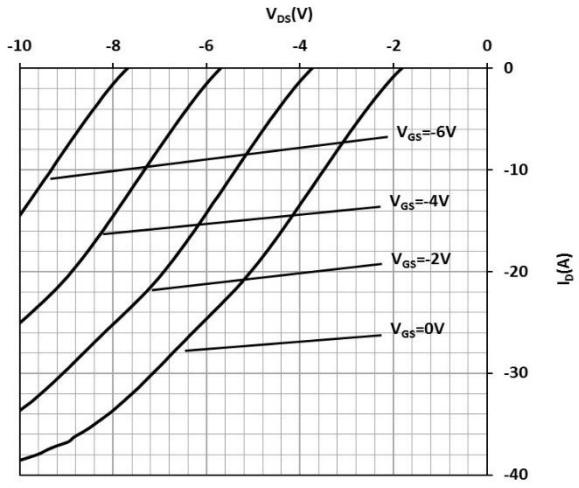
$R_{DS(on)} = f(I_D, V_{GS})$; T_j = 25 °C



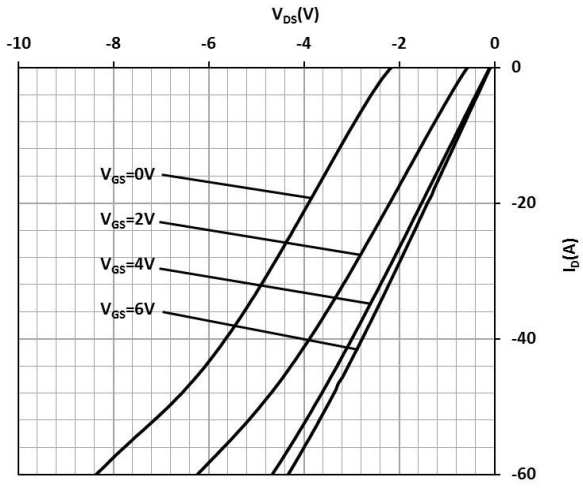
$R_{DS(on)} = f(I_D, V_{GS})$; T_j = 125 °C



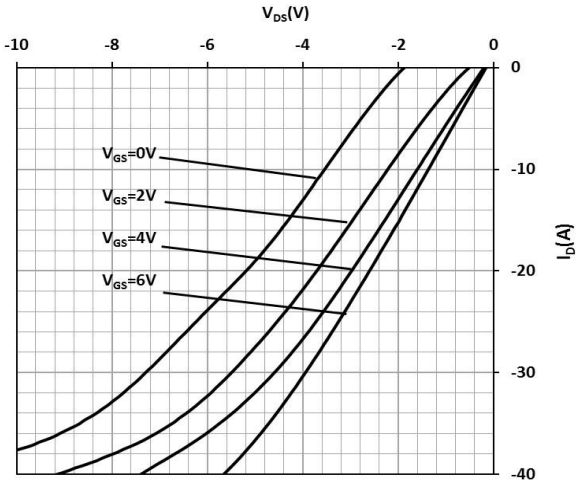
$I_D = f(V_{DS},V_{GS})$; T_j= 25 °C



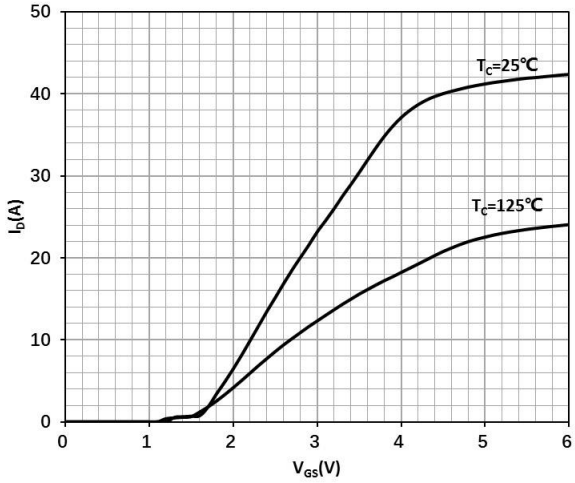
$I_D = f(V_{DS},V_{GS})$; T_j = 125 °C



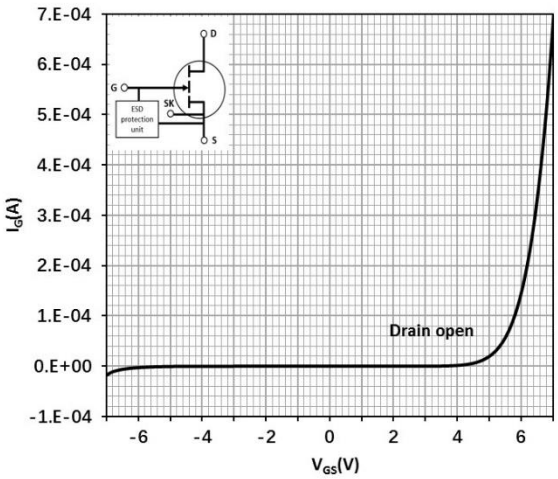
$I_D = f(V_{DS},V_{GS})$; T_j = 25 °C



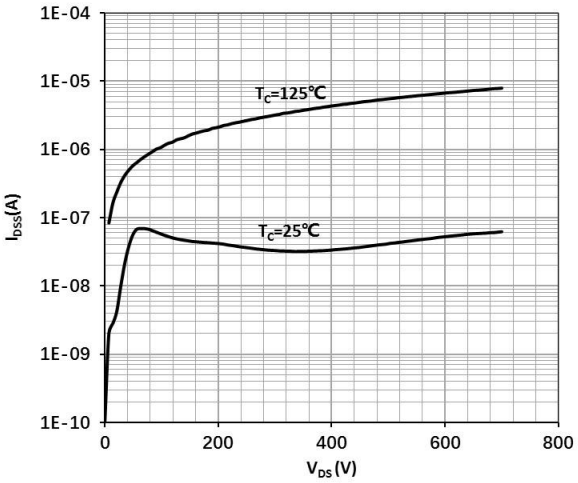
$I_D = f(V_{DS},V_{GS})$; T_j = 125 °C



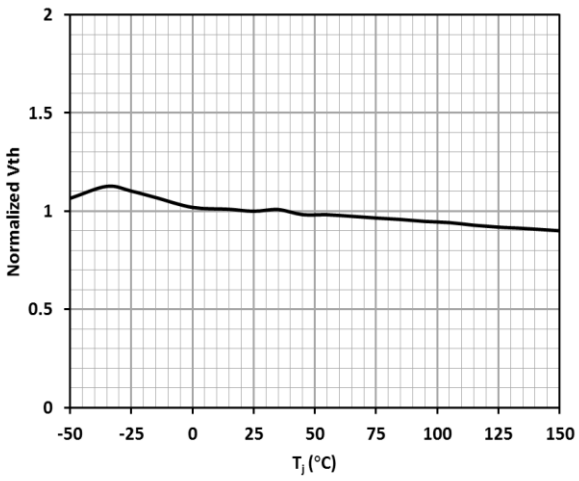
$I_D = f(V_{GS})$; V_{DS}= 3 V



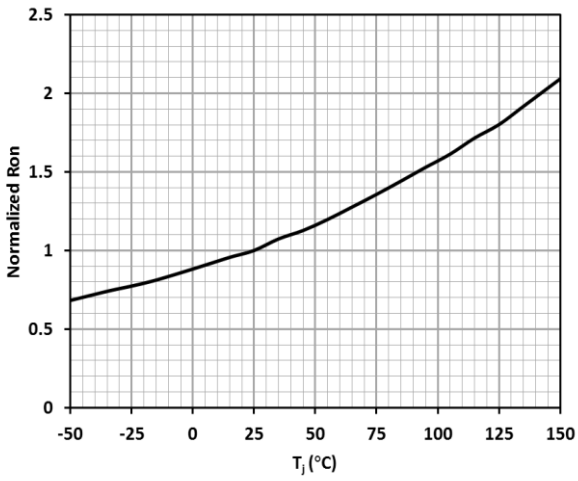
$I_G = f(V_{GS})$



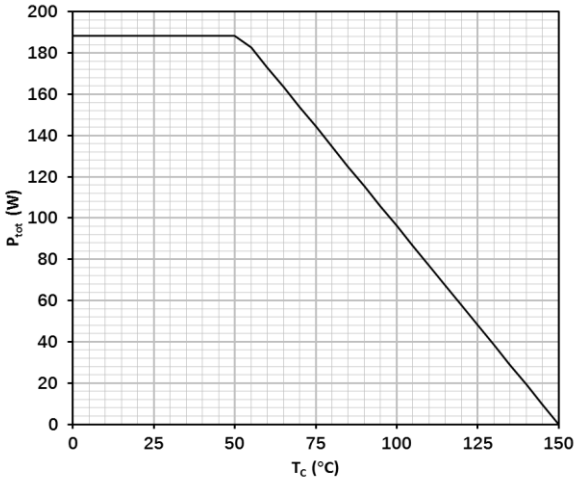
$_{DSS} = f(V_{DS})$; V_{GS} = 0 V



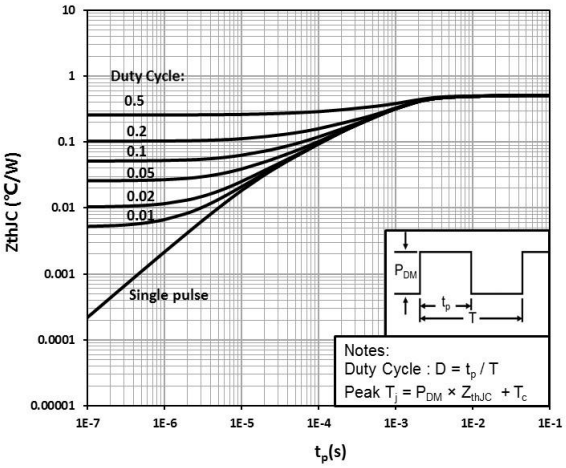
$V_{TH} = f(T_j)$; $V_{GS} = V_{DS}$; I_D = 30.7 mA



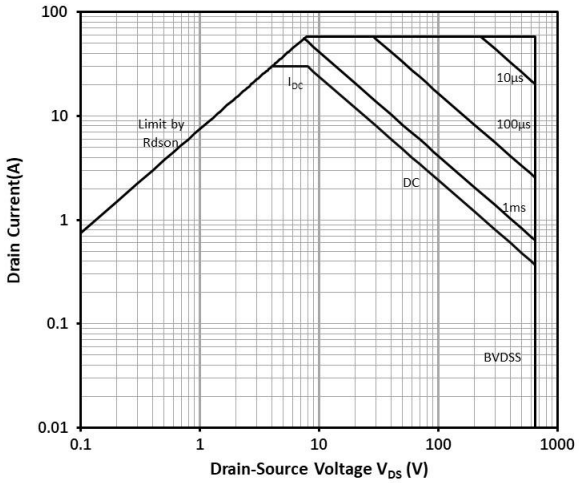
$R_{DS(on)} = f(T_j)$; I_D = 8 A; V_{GS}=6V



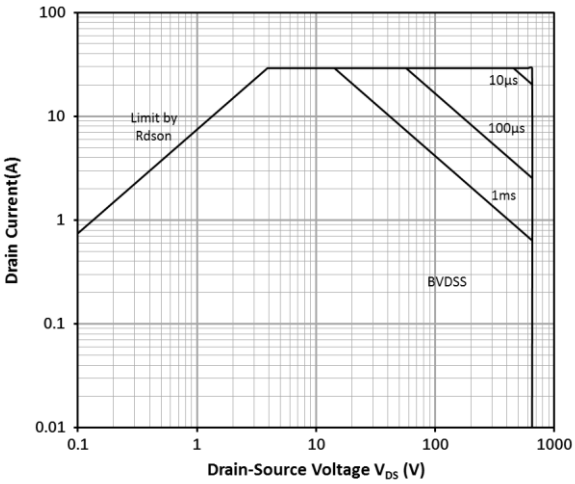
$P_{tot} = f(T_C)$



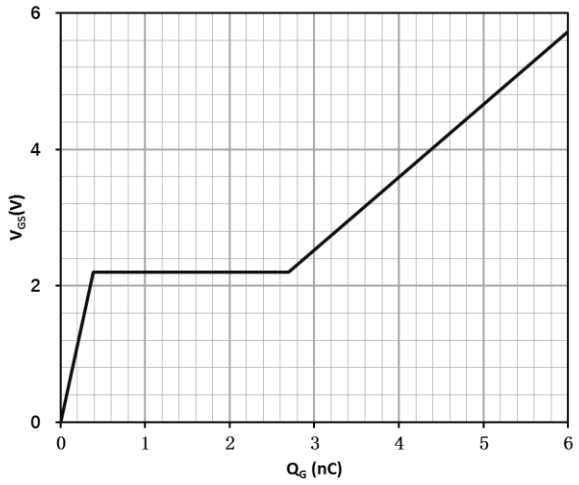
$Z_{thJC} = f(t_P, D)$



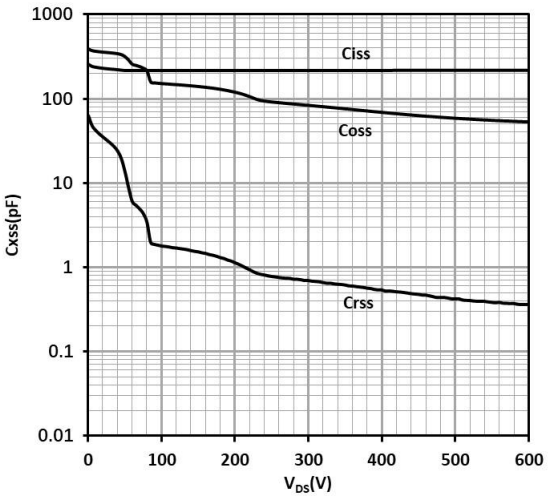
$I_D = f(V_{DS})$; $T_C = 25$ °C



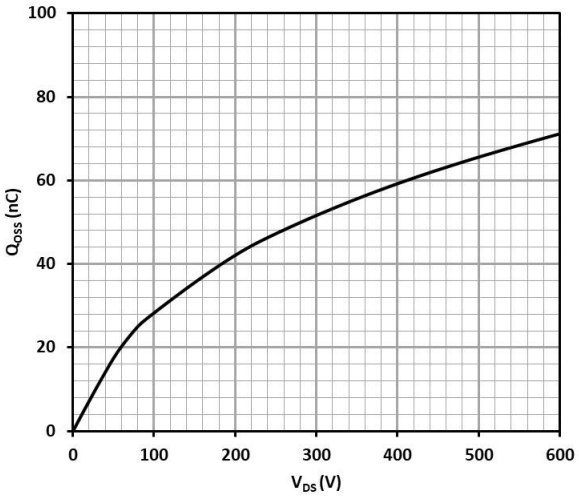
$I_D = f(V_{DS})$; $T_C = 125$ °C



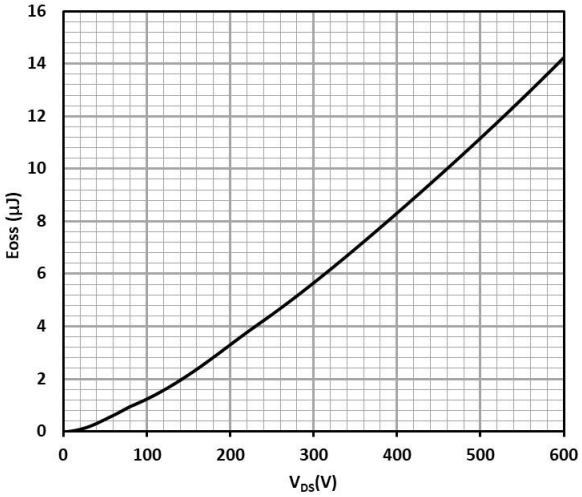
$V_{GS} = f(Q_G)$; $V_{DCLINK} = 400$ V; $I_D = 8$ A



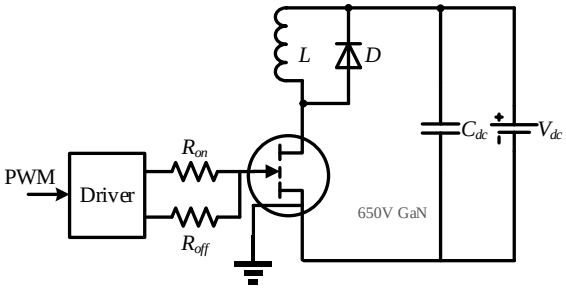
$C_{XSS} = f(V_{DS})$; Freq. = 100 kHz

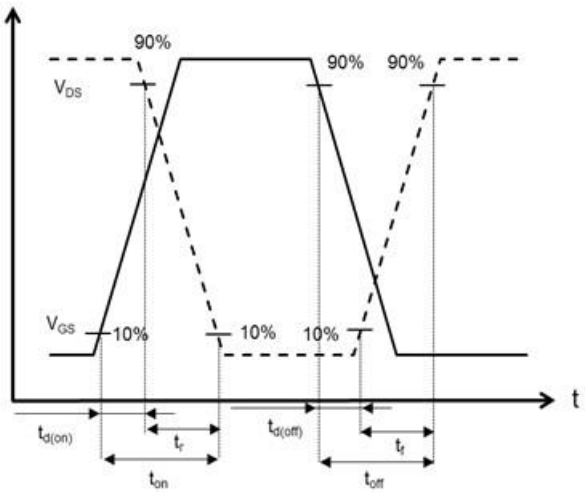


Q_{OSS} = f(V_{DS}); Freq. = 100 kHz



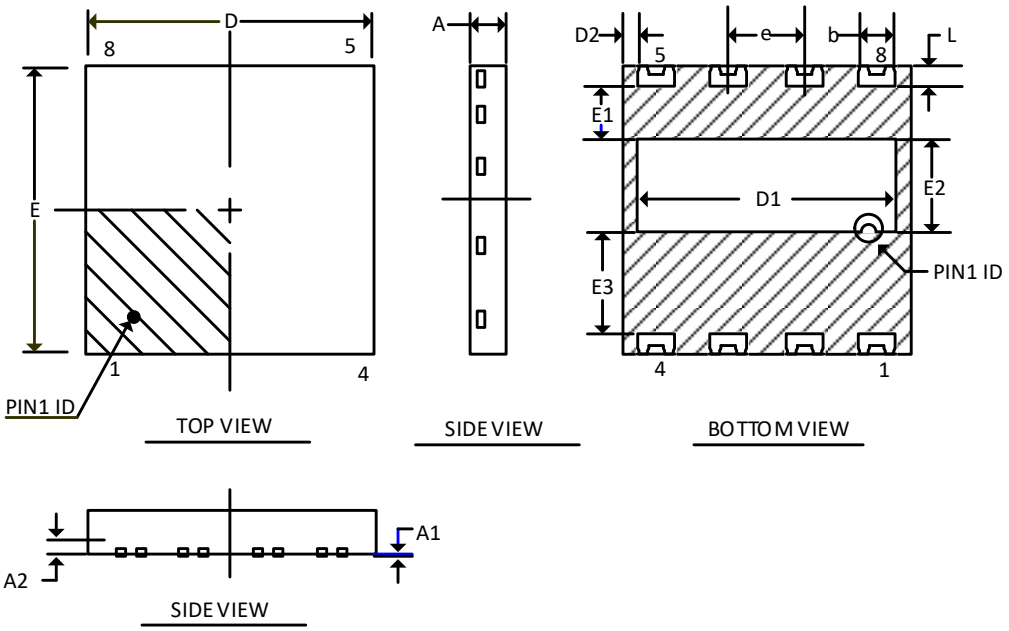
E_{OSS} = f(V_{DS}); Freq. = 100 kHz





V_{DS} = 400 V, I_D = 16 A, L = 318 µH, V_{GS} = 6 V,
R_{on} = 10 Ω, R_{off} = 2 Ω

Package outlines



SYMBOL	DIMENSION			SYMBOL	DIMENSION		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.80	0.90	1.00	E	8.00 B.S.C		
A1	0.00	0.02	0.05	E1	0.90	1.00	1.10
A2	---	0.203 ref	---	E2	3.10	3.20	3.30
b	0.92	1.00	1.05	E3	2.70	2.80	2.90
D	8.00 B.S.C			e	2.00 B.S.C		
D1	6.84	6.94	7.04	L	0.40	0.50	0.60
D2	0.40	0.50	0.60				