

Features

- Dual Asymmetric N-Channel
- High Current Capability
- Low on-resistance $R_{DS(on)}$ @ $V_{GS}=4.5\text{ V}$
- Low Gate Charge
- Pb-free lead plating; RoHS compliant

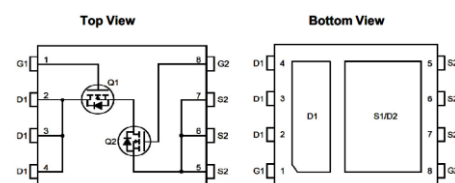
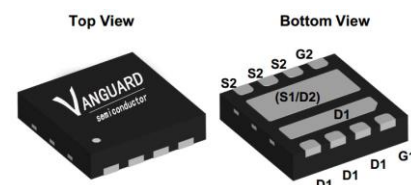


Halogen-Free

Part ID	Package Type	Marking	Tape and reel information
VS3628DB	DFN3x3	3628DB	5000pcs/Reel

V_{DS}	30	30	V
$R_{DS(on),TYP@ V_{GS}=10\text{ V}}$	14	6	mΩ
$R_{DS(on),TYP@ V_{GS}=4.5\text{ V}}$	23	9	mΩ
I_D	20	40	A

DFN3x3



Maximum ratings, at $T_A=25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter		Rating		Unit
			Q1	Q2	
$V_{(BR)DSS}$	Drain-Source breakdown voltage		30	30	V
V_{GS}	Gate-Source voltage		±20	±20	V
I_S	Diode continuous forward current	$T_C=25^{\circ}\text{C}$	20	40	A
I_D	Continuous drain current @ $V_{GS}=10\text{V}$ ①	$T_C=25^{\circ}\text{C}$	20	40	A
		$T_C=100^{\circ}\text{C}$	12	25	A
I_{DM}	Pulse drain current tested ②	$T_C=25^{\circ}\text{C}$	80	160	A
I_{DSM}	Continuous drain current @ $V_{GS}=10\text{V}$	$T_A=25^{\circ}\text{C}$	9	14	A
		$T_A=70^{\circ}\text{C}$	7	11	A
P_D	Maximum power dissipation	$T_C=25^{\circ}\text{C}$	14	21	W
P_{DSM}	Maximum power dissipation ③	$T_A=25^{\circ}\text{C}$	2.8	2.8	W
T_{STG}, T_J	Storage and Junction Temperature Range		-55 to 150	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical		Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	9	5.9	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	45	45	$^\circ\text{C/W}$

Q1-Channel Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current(T _J =25°C)	V _{DS} =30V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _J =125°C)	V _{DS} =30V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	1.3	1.9	2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =10V, I _D =10A	--	14	20	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =4.5V, I _D =6A	--	23	31	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =15V,V _{GS} =0V, f=1MHz	390	460	530	pF
C _{oss}	Output Capacitance		65	75	85	pF
C _{rss}	Reverse Transfer Capacitance		50	60	70	pF
R _g	Gate Resistance	f=1MHz	--	4.7	--	Ω
Q _g	Total Gate Charge	V _{DS} =15V,I _D =10A, V _{GS} =10V	--	11.3	--	nC
Q _{gs}	Gate-Source Charge		--	3	--	nC
Q _{gd}	Gate-Drain Charge		--	4.3	--	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =15V, I _D =10A, R _G =3Ω, V _{GS} =10V	--	7	--	ns
t _r	Turn-on Rise Time		--	10	--	ns
t _{d(off)}	Turn-Off Delay Time		--	22	--	ns
t _f	Turn-Off Fall Time		--	7	--	ns
Source- Drain Diode Characteristics@ T _J = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =10A,V _{GS} =0V	--	0.9	1.2	V
t _{rr}	Reverse Recovery Time	T _J =25°C ,I _{sd} =10A, V _{GS} =0V di/dt=500A/μs	--	9.5	--	ns
Q _{rr}	Reverse Recovery Charge		--	11.8	--	nC

- NOTE: ① The maximum current rating is limited by package
 ② Repetitive rating; pulse width limited by max junction temperature.
 ③ The power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C
 ④ Pulse width ≤ 300μs; duty cycles ≤ 2%.

Q2-Channel Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	30	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current t(T _J =25°C)	V _{DS} =30V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current t(T _J =125°C)	V _{DS} =30V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	1.3	1.8	2.4	V
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =10V, I _D =15A	--	6	8.5	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance ④	V _{GS} =4.5V, I _D =10A	--	9	12	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _D S=15V,V _G S=0V, f=1MHz	1000	1175	1350	pF
C _{oss}	Output Capacitance		150	180	210	pF
C _{rss}	Reverse Transfer Capacitance		115	135	155	pF
R _g	Gate Resistance	f=1MHz	--	4.6	--	Ω
Q _g	Total Gate Charge	V _D S=15V,I _D =15A, V _G S=10V	--	20	--	nC
Q _{gs}	Gate Source Charge		--	5.4	--	nC
Q _{gd}	Gate Drain Charge		--	5	--	nC
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _D D=15V, I _D =15A, R _G =3Ω, V _G S=10V	--	8	--	ns
t _r	Turn on Rise Time		--	5	--	ns
t _{d(off)}	Turn Off Delay Time		-	23	--	ns
t _f	Turn Off Fall Time		--	5	--	ns
Source Drain Diode Characteristics						
V _{SD}	Forward on voltage	I _{SD} =10A,V _{GS} =0V	--	0.9	1.2	V
t _{rr}	Reverse Recovery Time	T _J =25°C ,I _{sd} =15A, V _G S=0V	--	10.5	--	ns
Q _{rr}	Reverse Recovery Charge	di/dt=-500A/μs	--	15	--	nC

- NOTE: ① The maximum current rating is limited by package
 ② Repetitive rating; pulse width limited by max. junction temperature.
 ③ The power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C
 ④ Pulse width ≤ 300μs; duty cycles ≤ 2%.



Q1-Channel Typical Characteristics

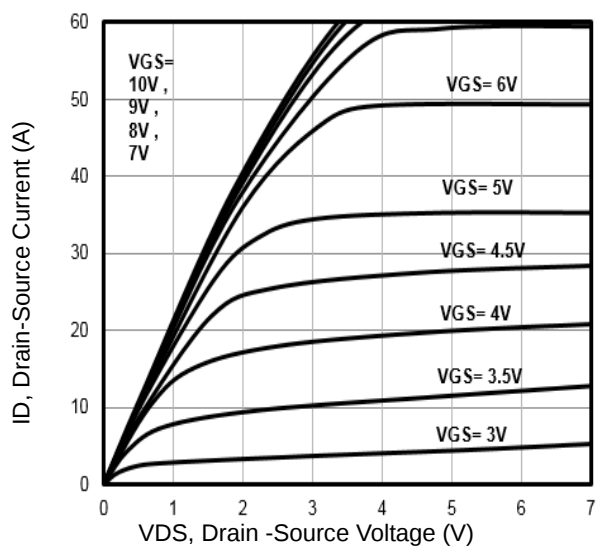


Fig1. Typical Output Characteristics

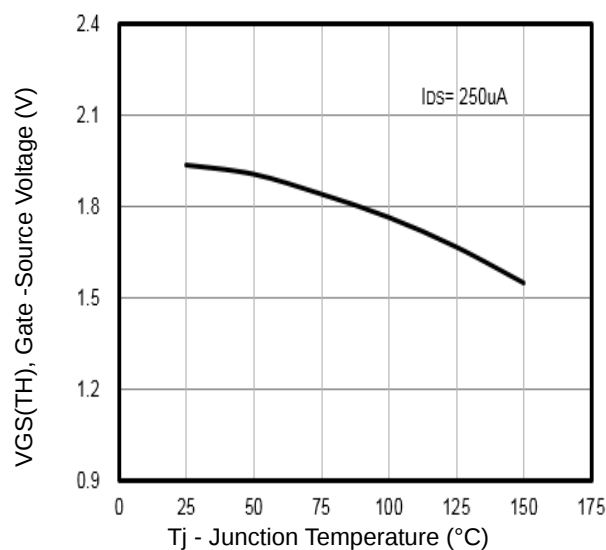


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

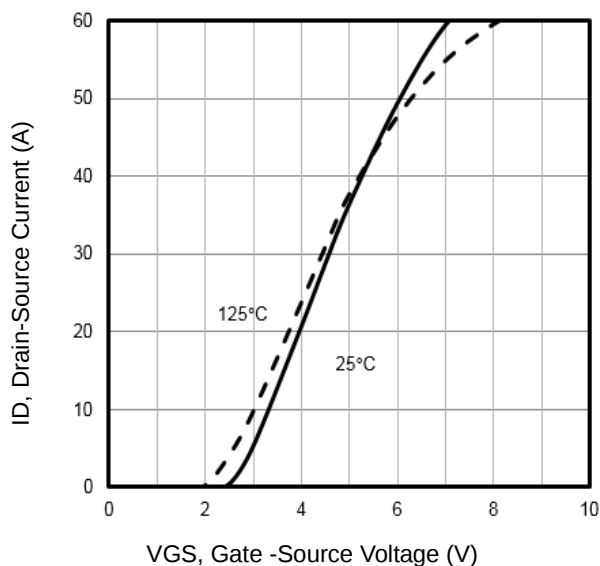


Fig3. Typical Transfer Characteristics

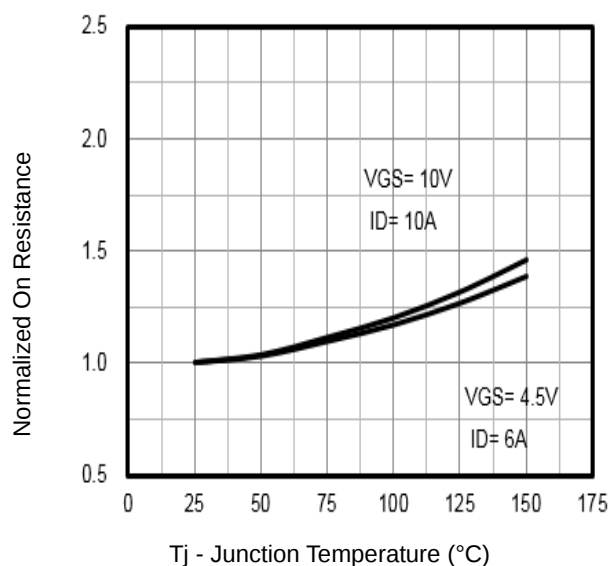


Fig4. Normalized On-Resistance Vs. T_j

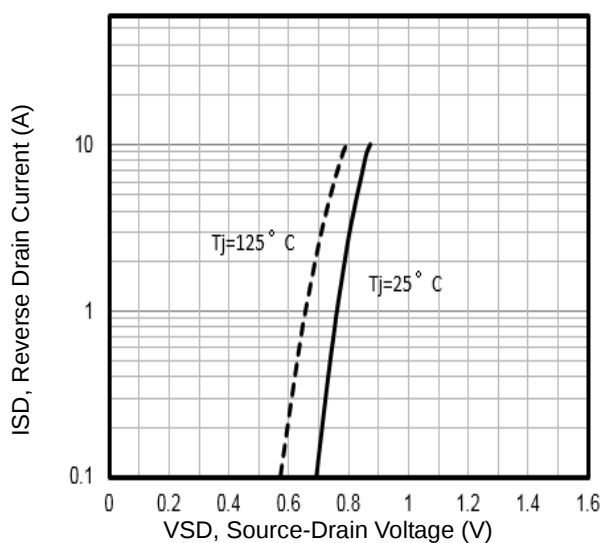


Fig5. Typical Source-Drain Diode Forward Voltage

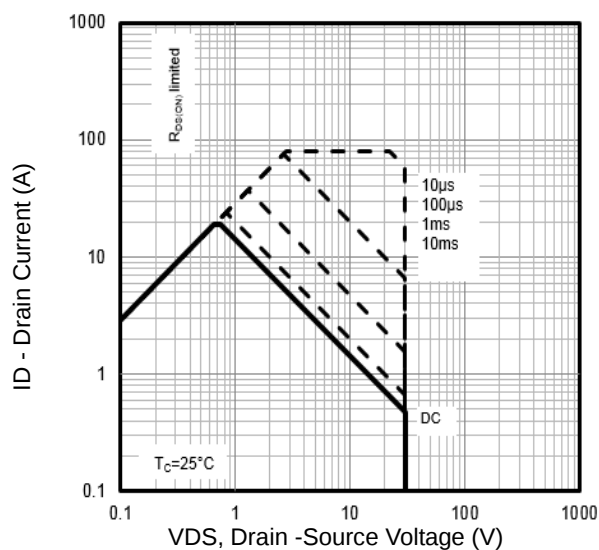


Fig6. Maximum Safe Operating Area

Q1-Channel Typical Characteristics

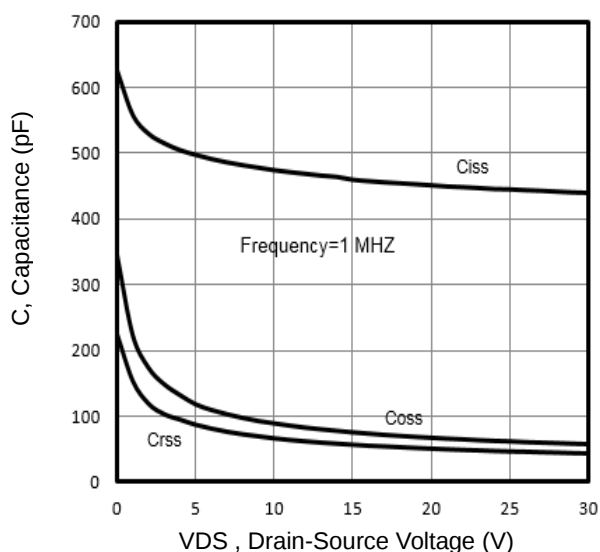


Fig7. Typical Capacitance Vs. Drain-Source Voltage

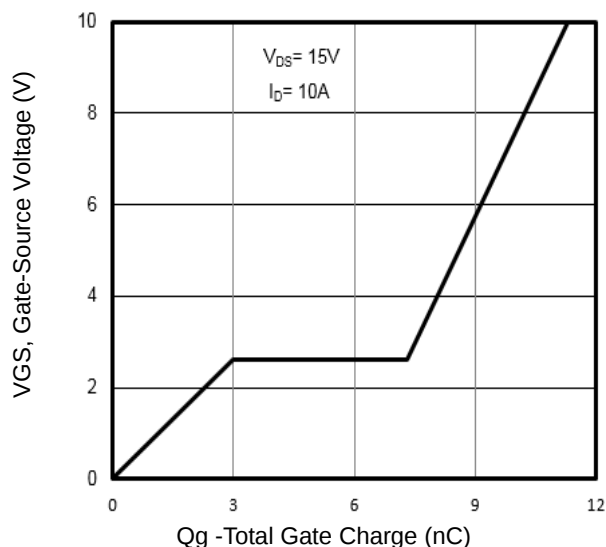


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

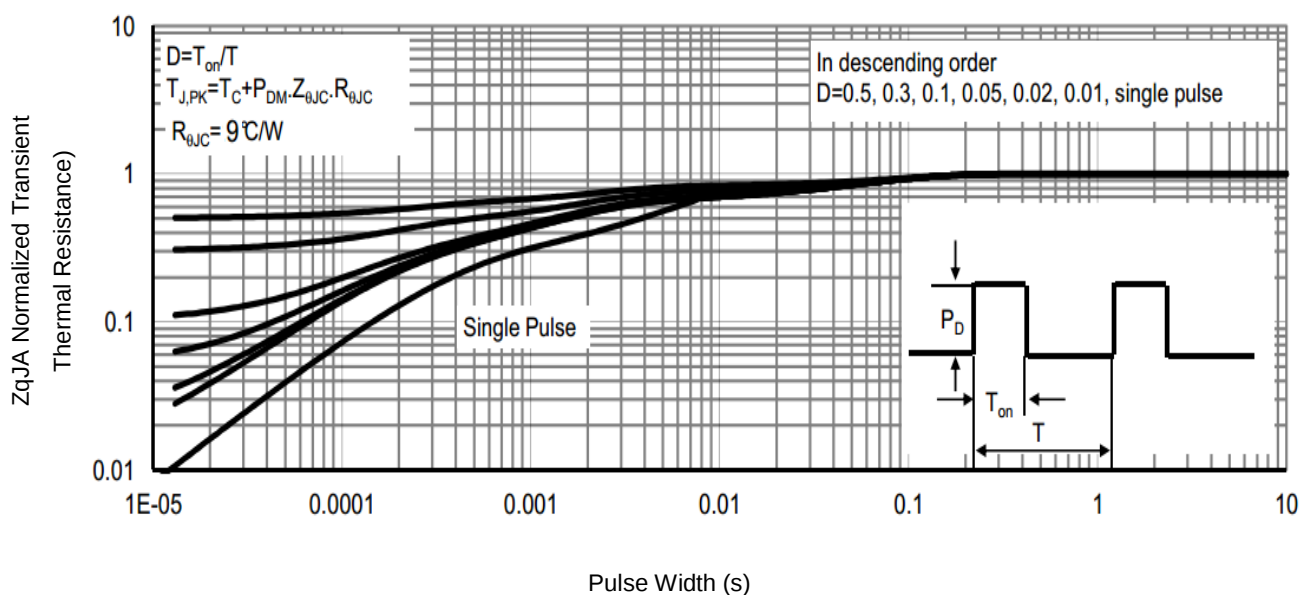


Fig 9 .Normalized Maximum Transient Thermal Impedance

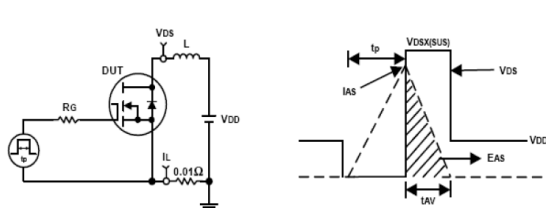


Fig10. Unclamped Inductive Test Circuit and waveforms

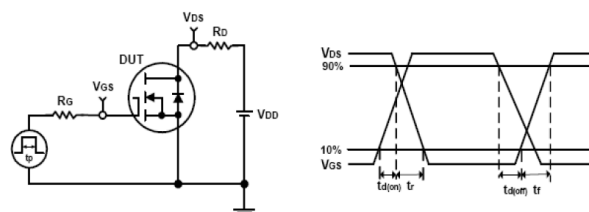


Fig11. Switching Time Test Circuit and waveforms

Q2-Channel Typical Characteristics

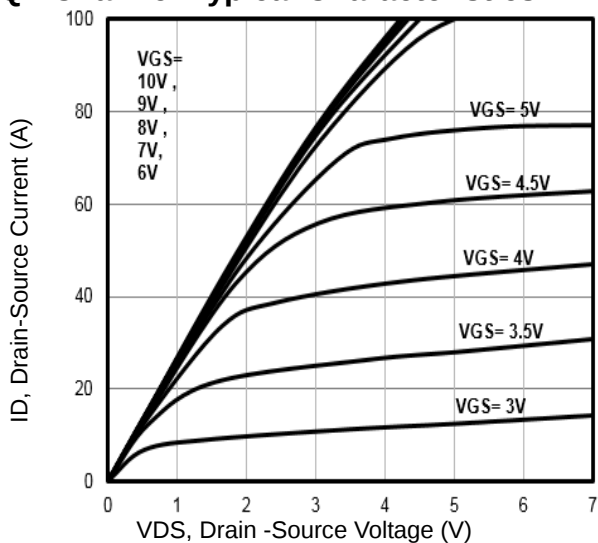


Fig1. Typical Output Characteristics

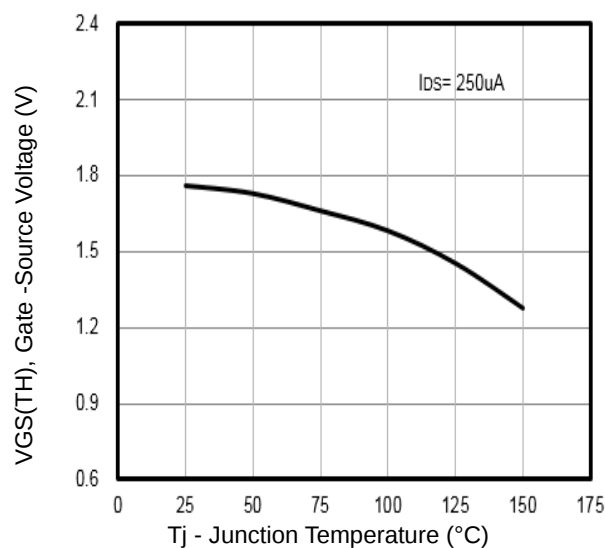


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

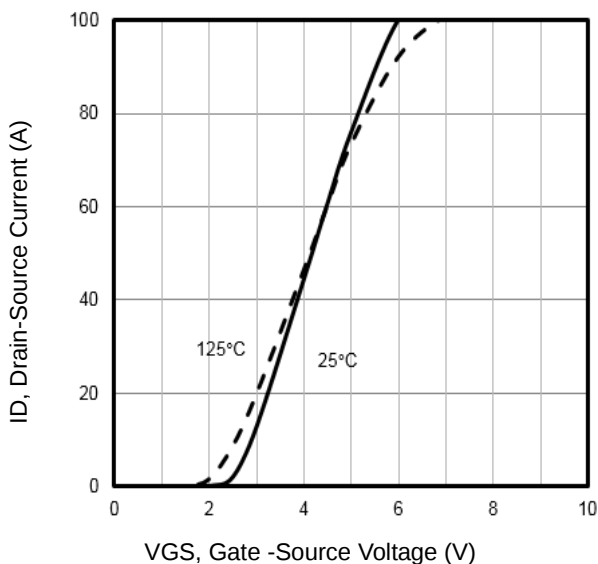


Fig3. Typical Transfer Characteristics

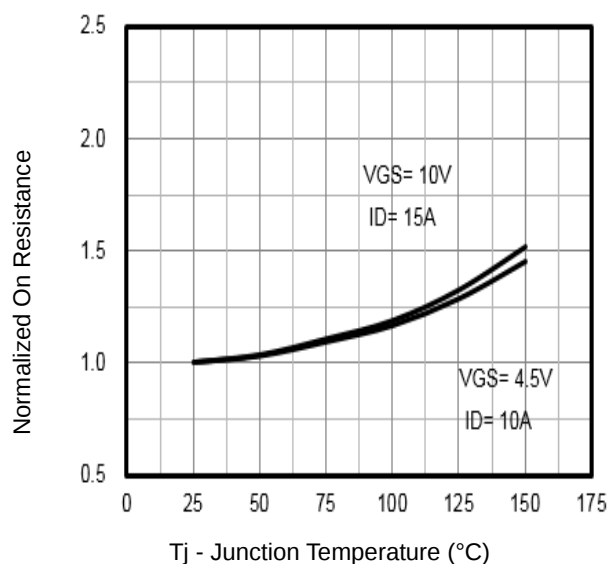


Fig4. Normalized On-Resistance Vs. T_j

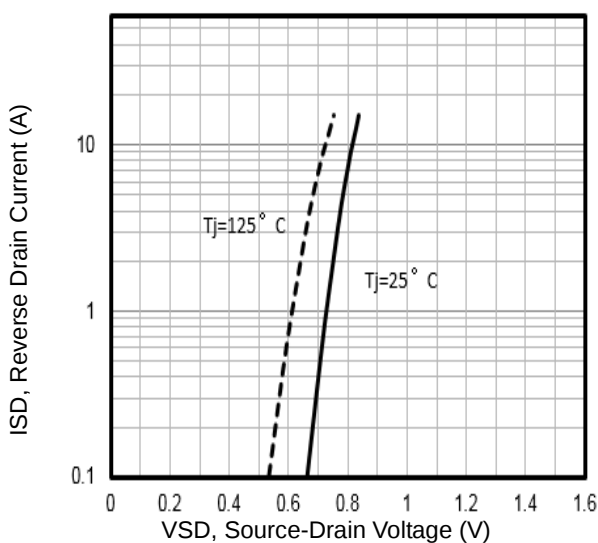


Fig5. Typical Source-Drain Diode Forward Voltage

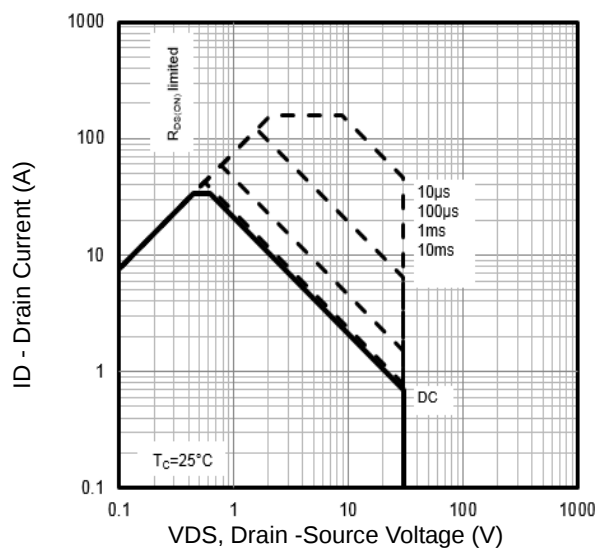


Fig6. Maximum Safe Operating Area

Q2-Channel Typical Characteristics

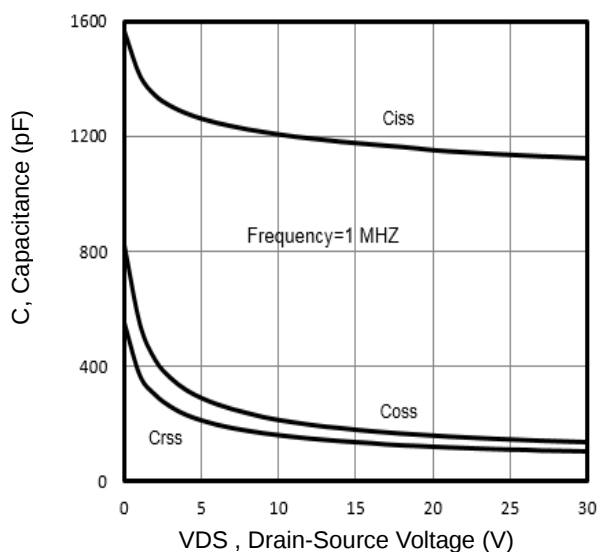


Fig7. Typical Capacitance Vs. Drain-Source Voltage

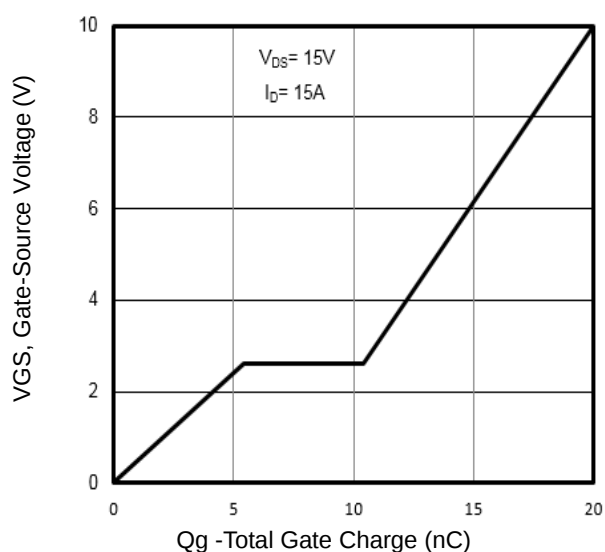


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

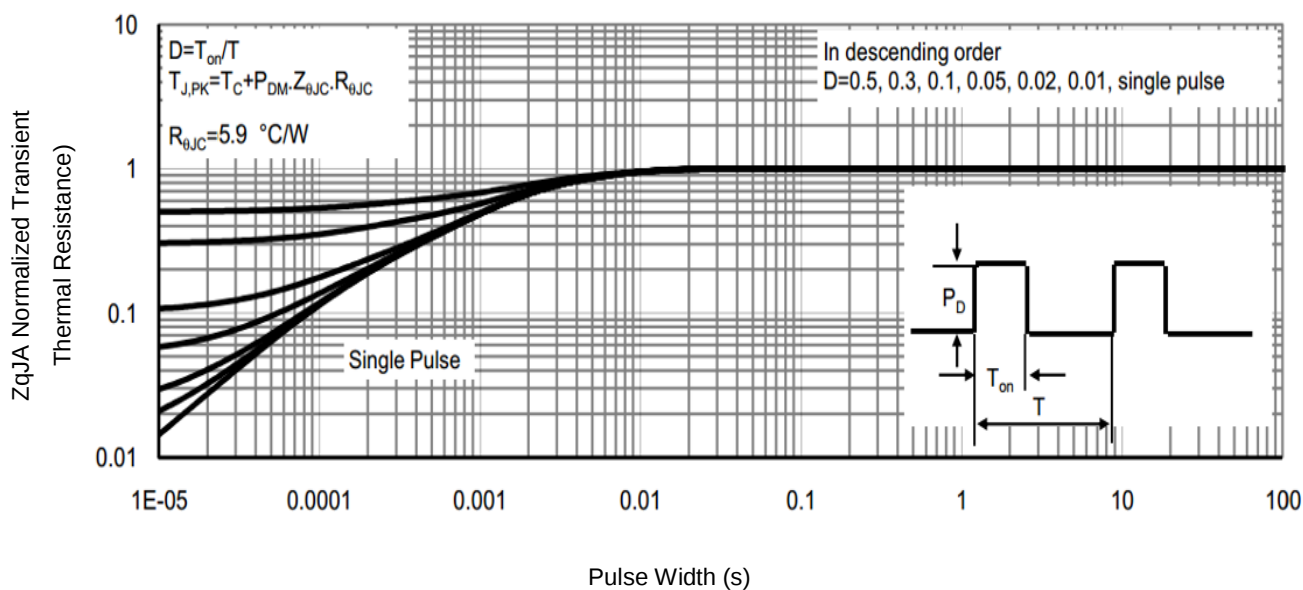


Fig 9 .Normalized Maximum Transient Thermal Impedance

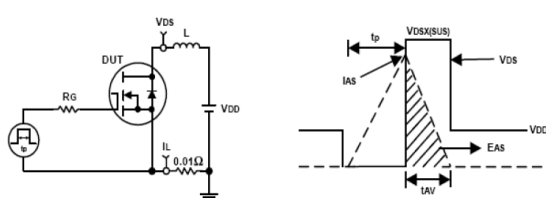


Fig10. Unclamped Inductive Test Circuit and waveforms

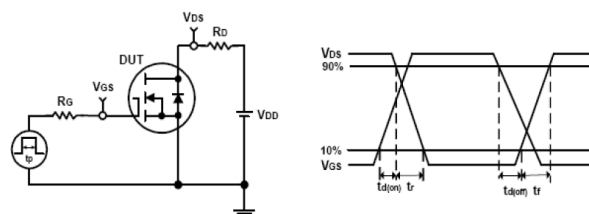


Fig11. Switching Time Test Circuit and waveforms



Marking Information



1st line: Vanguard Code (Vs)

2nd line: Part Number (3628DB)

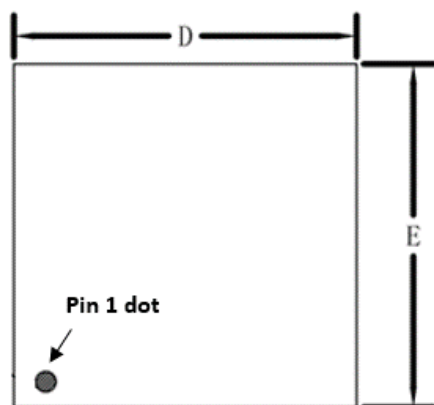
3rd line: Date code (XXXYWW)

XXX: Wafer Lot Number

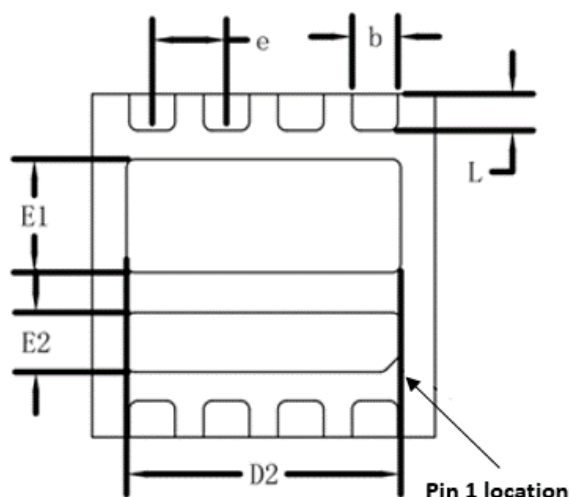
Y: Year Code, e.g. E means 2017

WW: Week Code

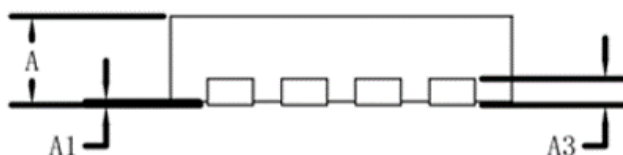
DFN3x3 Dual Package Outline Data



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	0.70	0.75	0.80
A1	0.00	--	0.05
A3	0.20 REF		
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	2.30	2.40	2.50
E2	0.42	0.52	0.62
E1	0.89	0.99	1.09
b	0.35	0.40	0.45
L	0.27	0.32	0.37
e	0.65 BSC		

Customer Service

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