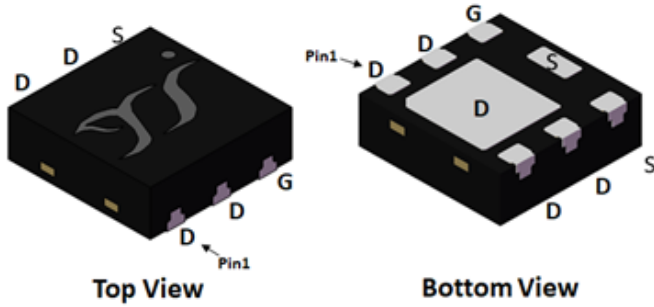
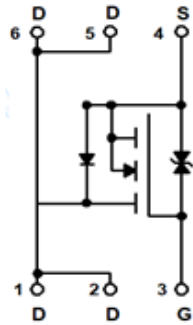


N-Channel Enhancement Mode Field Effect Transistor



DFN2020-6L-WF



Product Summary

- V_{DS} 40V
- I_D 19.8A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) $<24m\Omega$
- $R_{DS(ON)}$ (at $V_{GS}=4.5V$) $<34m\Omega$
- ESD Protected Up to 2KV (HBM)

General Description

- Package with side-wettable flanks
- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Relay driver
- High-speed line driver
- Low-side load switch
- Switching circuits

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage			V _{DS}	-	40	V
Gate-source Voltage			V _{GS}	-20	20	
Continuous Drain Current (Note 1,2)	Steady-State	T _A =25°C,V _{GS} =10V	I _D	-	6.1	A
		T _A =100°C,V _{GS} =10V		-	4.3	
Continuous Drain Current (Note 1,3)	Steady-State	T _C =25°C,V _{GS} =10V,Chip limitation		-	19.8	
		T _C =100°C,V _{GS} =10V		-	14	
Pulsed Drain Current	T _C =25°C,t _p ≤10μs		I _{DM}	-	79.2	
Maximum Body-Diode Continuous Current	T _C =25°C		I _S		16	
Total Power Dissipation (Note 1,2)	Steady-State	T _A =25°C	P _D	-	1.87	W
		T _A =100°C		-	0.93	
Total Power Dissipation (Note 1,3)	Steady-State	T _C =25°C		-	19.4	
		T _C =100°C		-	9.7	
Junction and Storage Temperature Range			T _J ,T _{STG}	-55	175	°C

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 2)	Steady-State	$R_{\theta JA}$	-	80	$^{\circ}C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	7.7	



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■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA, T _j =25°C	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V, T _j =25°C	-	-	1	μA
		V _{DS} =40V, V _{GS} =0V, T _j =125°C	-	-	100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V, T _j =25°C	-	-	±10	μA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA, T _j =25°C	1.3	1.7	2.3	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =5A, T _j =25°C	-	18	24	mΩ
		V _{GS} =4.5V, I _D =2.5A, T _j =25°C	-	24	34	mΩ
Diode Forward Voltage	V _{SD}	I _S =5A, V _{GS} =0V, T _j =25°C	-	0.83	1.2	V
Gate Resistance	R _G	f=1MHz, T _j =25°C	-	1.6	-	Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f=1MHz, T _j =25°C	-	712	-	pF
Output Capacitance	C _{oss}		-	56	-	
Reverse Transfer Capacitance	C _{rss}		-	47	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =10V, V _{DS} =20V, I _D =5A, T _j =25°C	-	14.5	-	nC
Gate-Source Charge	Q _{gs}		-	2.1	-	
Gate-Drain Charge	Q _{gd}		-	3.3	-	
Reverse Recovery Charge	Q _{rr}	I _F =5A, di/dt=100A/μs, V _{GS} =0V, V _R =20V, T _j =25°C	-	9	-	nC
Reverse Recovery Time	t _{rr}		-	13.9	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =10V, V _{DS} =20V, I _D =5A, R _{GEN} =3Ω, T _j =25°C	-	7	-	ns
Turn-on Rise Time	t _r		-	2.9	-	
Turn-off Delay Time	t _{D(off)}		-	19.7	-	
Turn-off Fall Time	t _f		-	3.3	-	

Note:

- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of $175^\circ C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).



■ Typical Electrical and Thermal Characteristics Diagrams

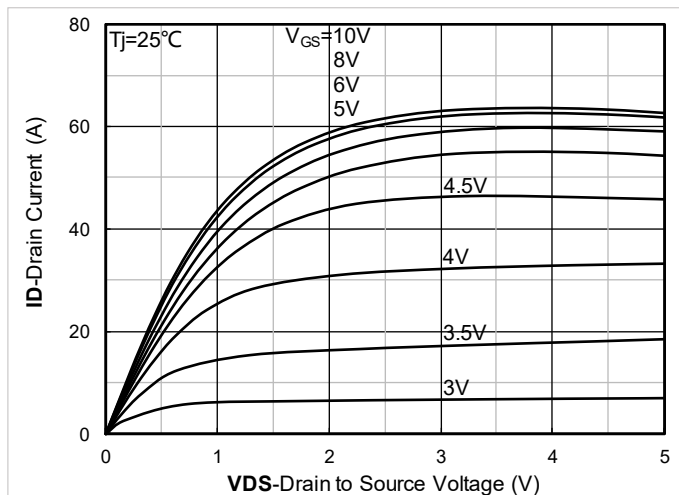


Figure 1. Output Characteristics; typical values

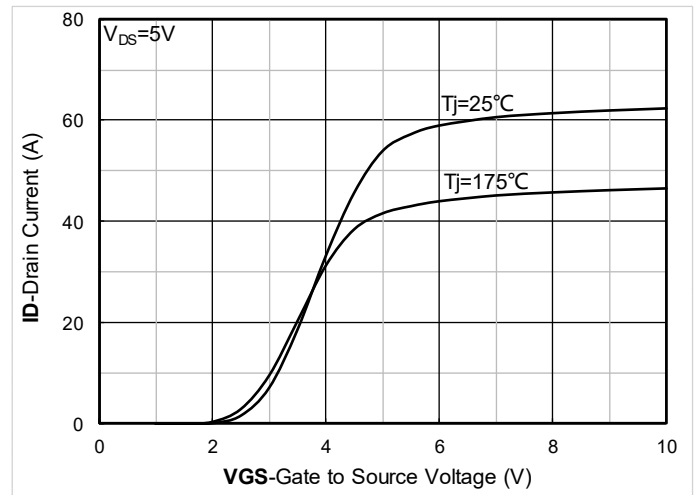


Figure 2. Transfer Characteristics; typical values

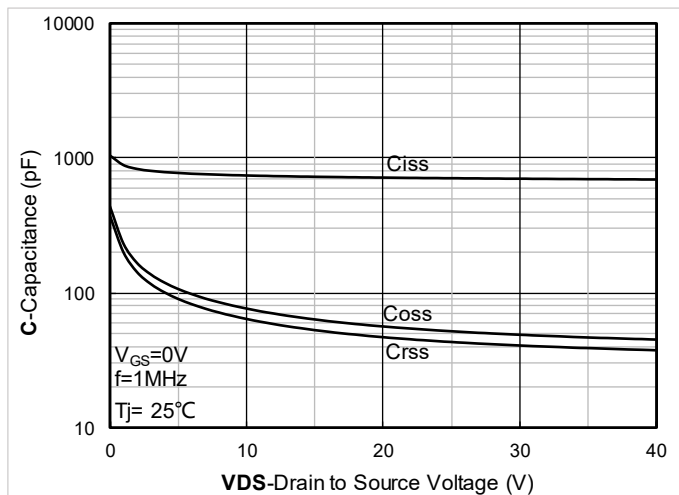


Figure 3. Capacitance Characteristics; typical values

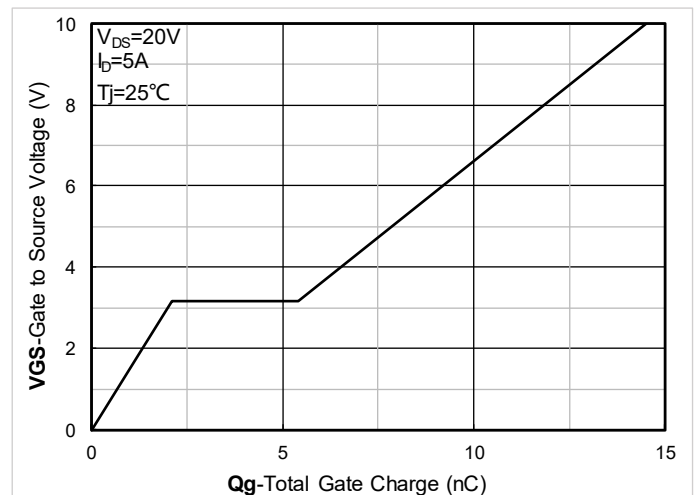


Figure 4. Gate Charge; typical values

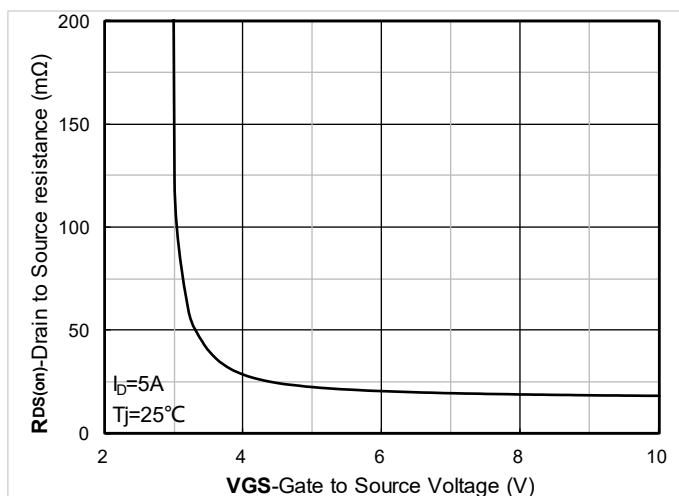


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

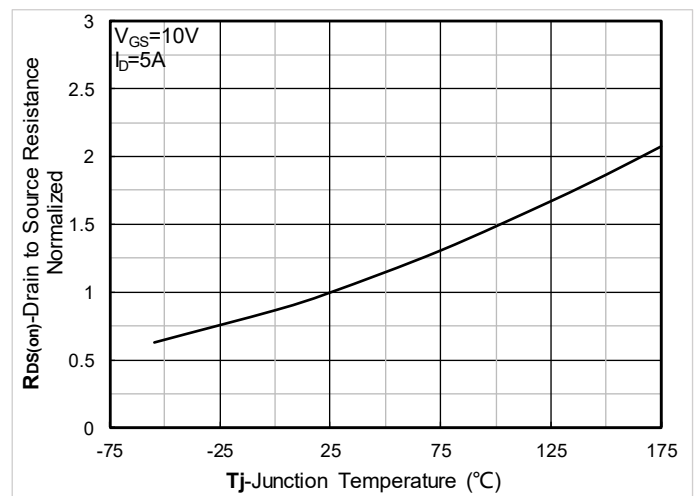


Figure 6. Normalized On-Resistance

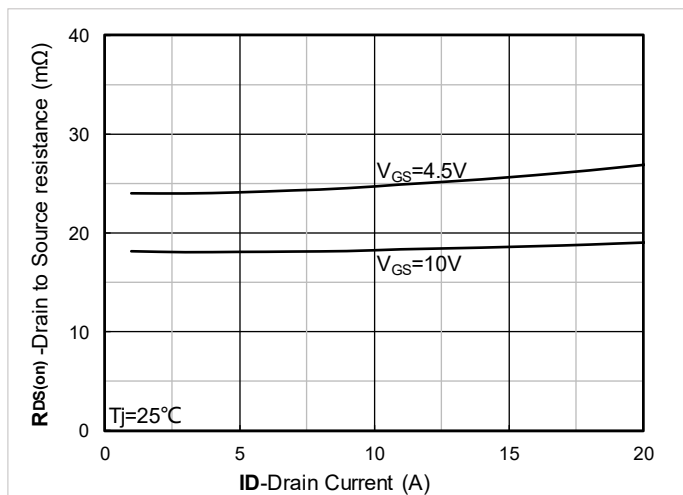


Figure 7. RDS(on) vs. Drain Current; typical values

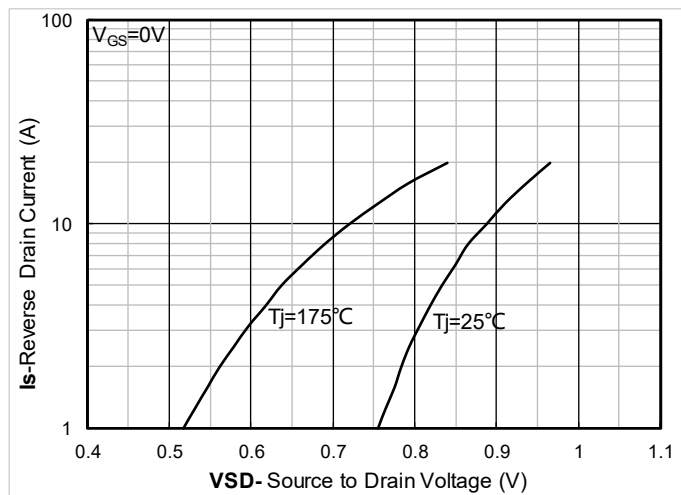


Figure 8. Forward characteristics of reverse diode; typical values

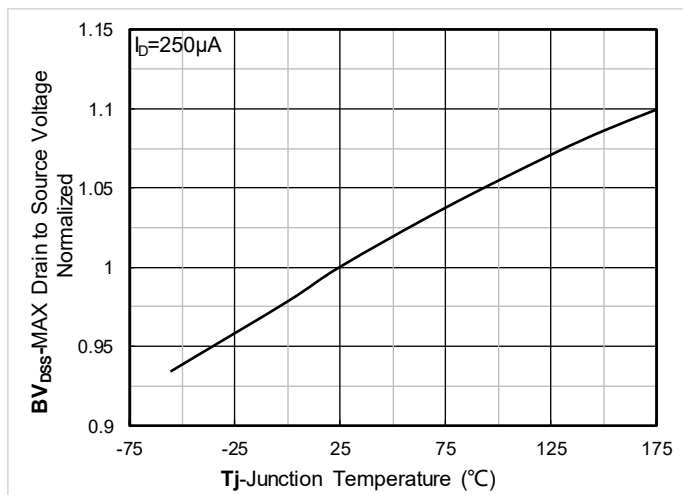


Figure 9. Normalized breakdown voltage

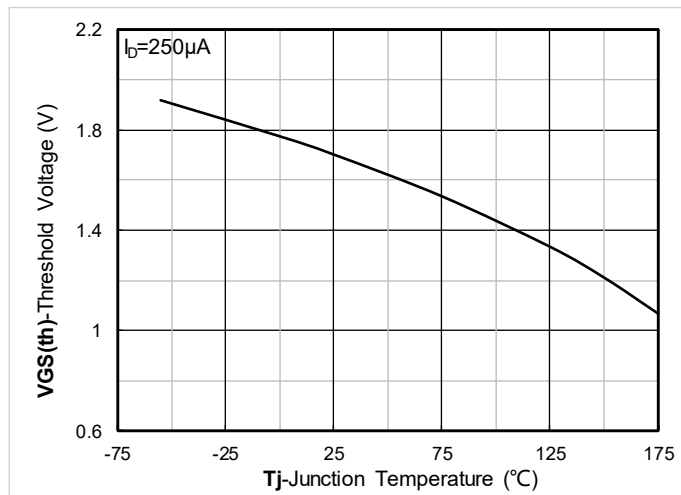


Figure 10. Gate Threshold voltage; typical values

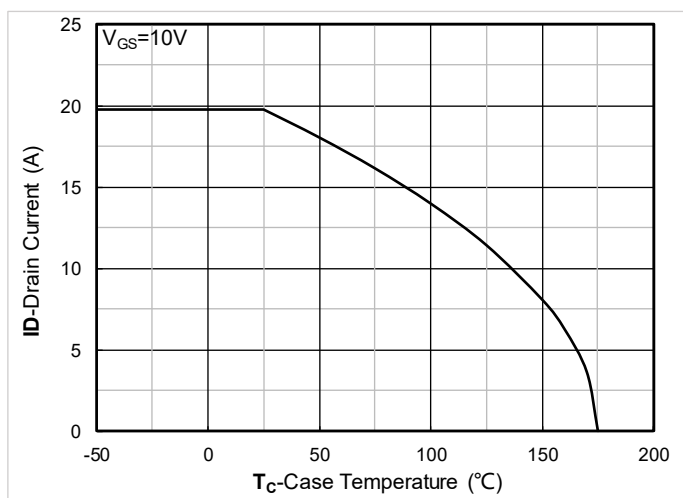


Figure 11. Current dissipation

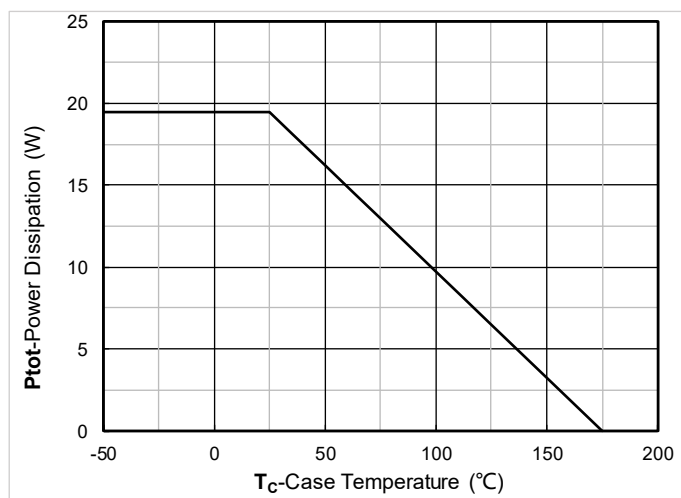


Figure 12. Power dissipation

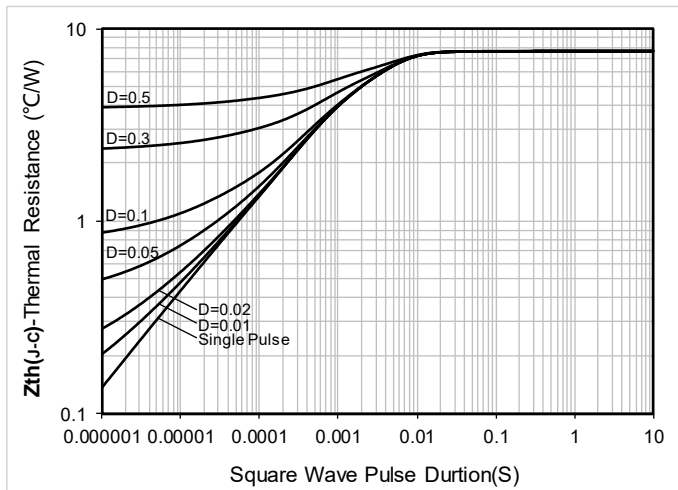


Figure 13. Maximum Transient Thermal Impedance

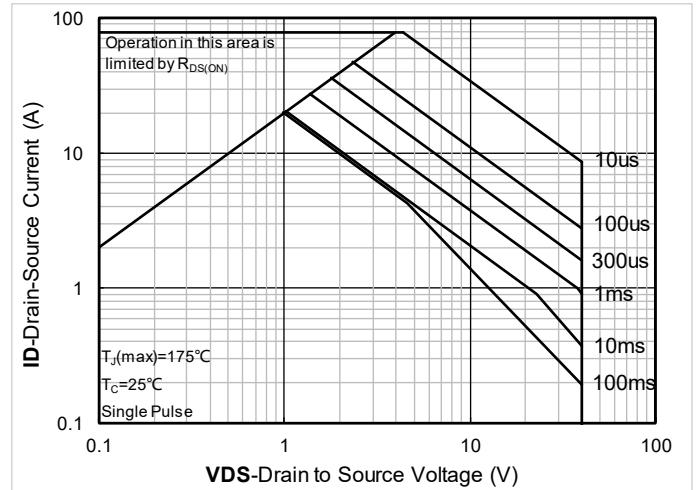


Figure 14. Safe Operation Area

■ Test Circuits & Waveforms

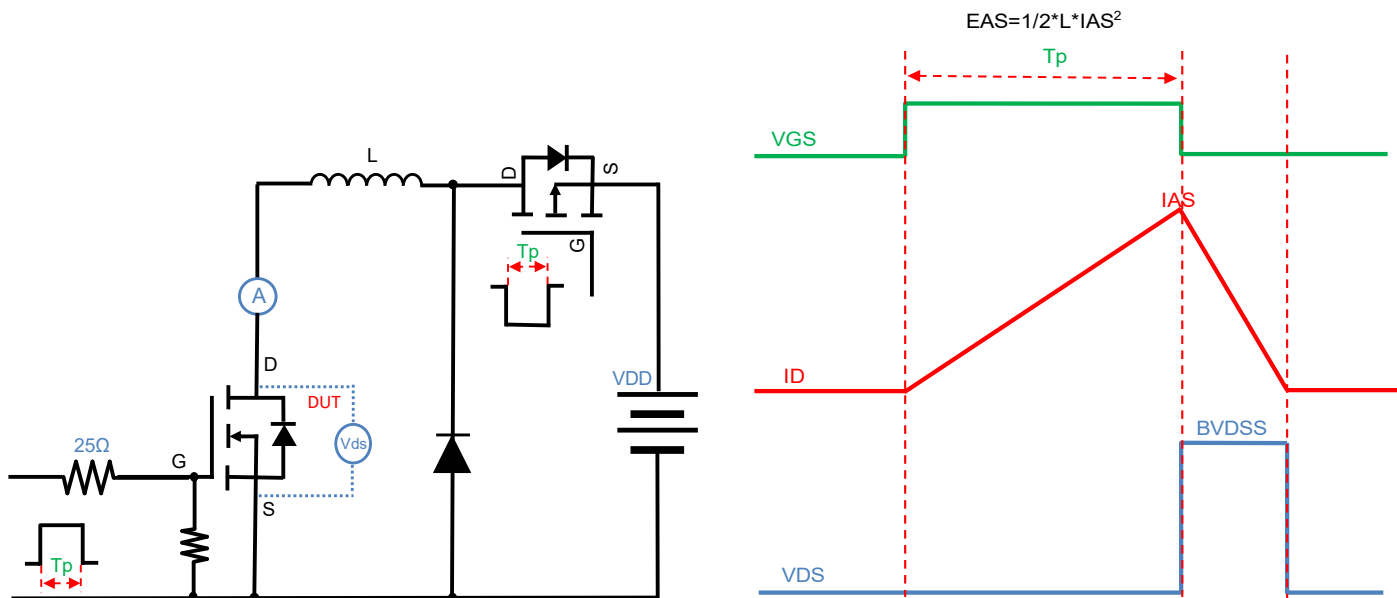


Figure A. Unclamped Inductive Switching (UIS) Test Circuit & Waveform

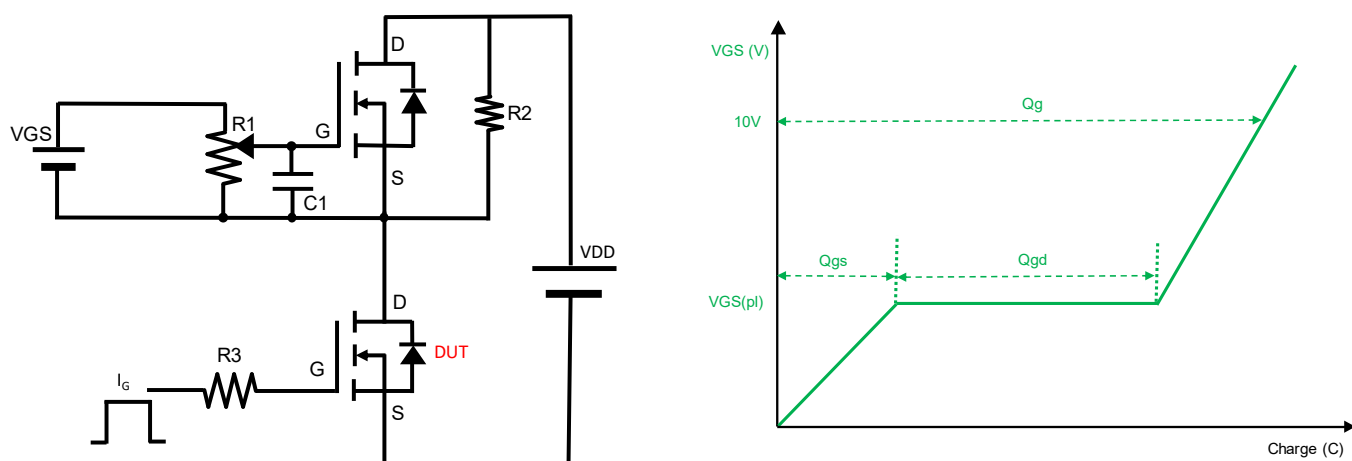


Figure B. Gate Charge Test Circuit & Waveform

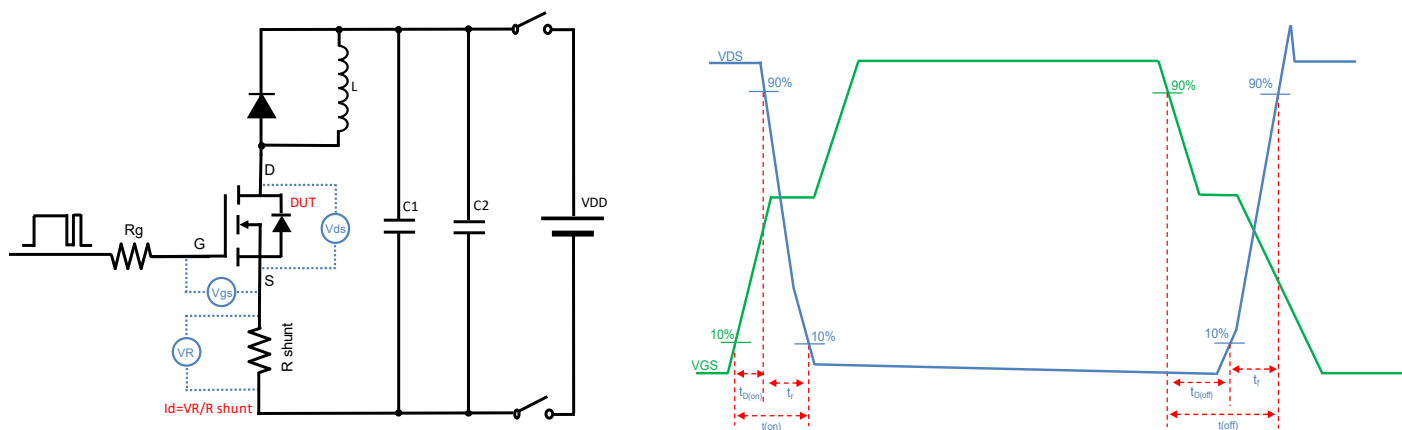


Figure C. Resistive Switching Test Circuit & Waveform

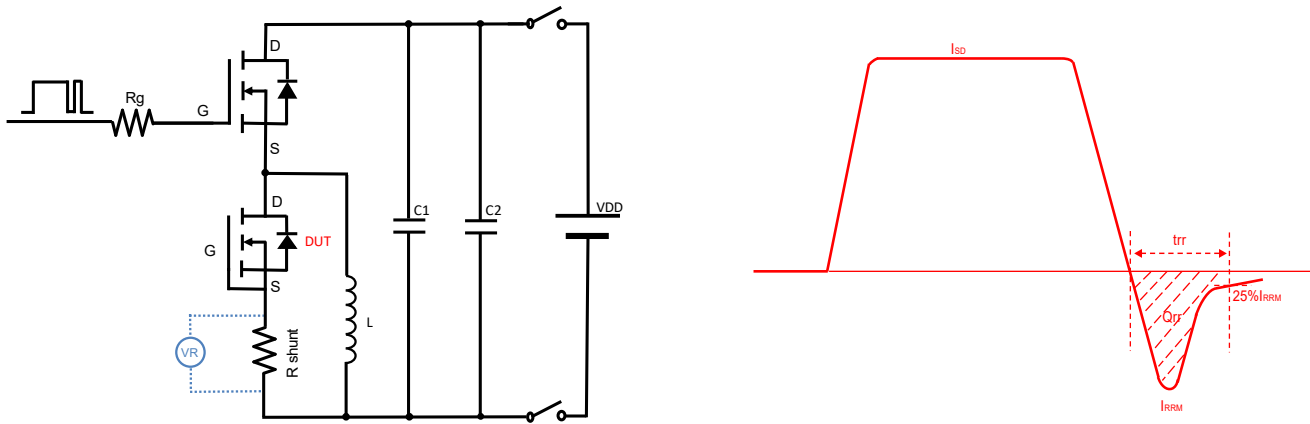
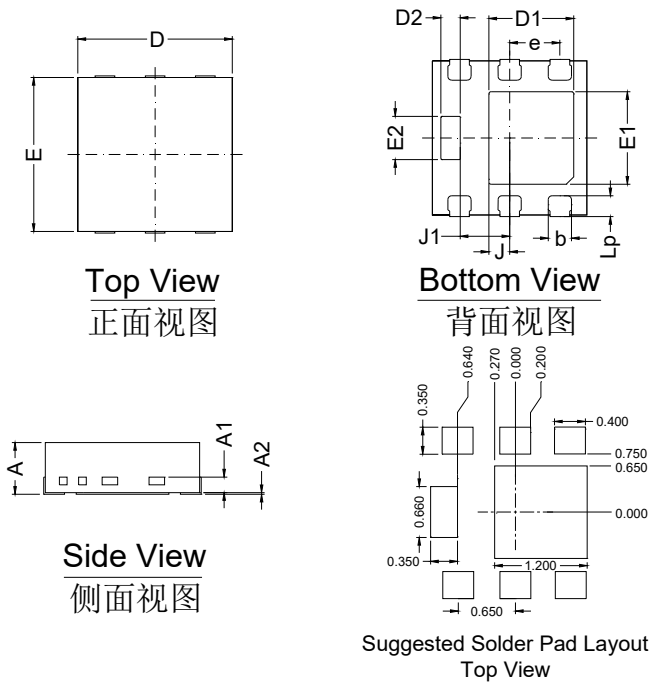


Figure D. Diode Recovery Test Circuit & Waveform



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■ DFN2020-6L-H-0.65MM Package information

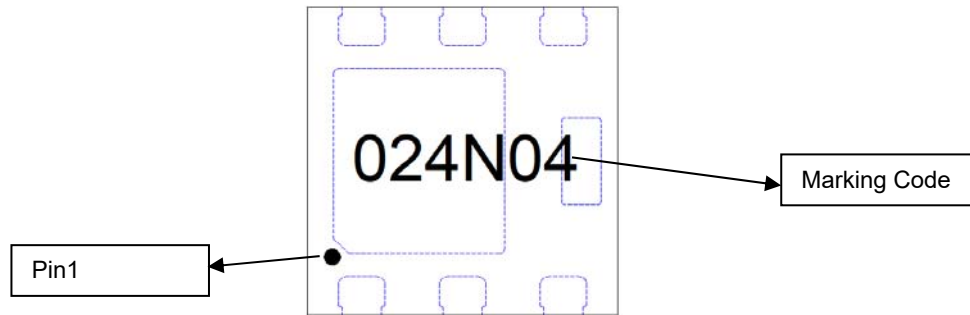


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
D	1.90	2.00	2.10
E	1.90	2.00	2.10
A	0.55	0.65	0.75
A1	0.20 BSC		
A2	0	-	0.10
D1	1.00	1.10	1.20
D2	0.20	0.25	0.35
E1	1.10	1.20	1.30
E2	0.51	0.56	0.66
Lp	0.20	0.25	0.35
J	0.27 BSC		
J1	0.64 BSC		
b	0.20	0.30	0.40
e	0.65 BSC		

Note:
1.Controlling dimension:in millimeters.
2.General tolerance:±0.10mm.
3.The pad layout is for reference purposes only.



■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. 024N04 is marking code
4. Body color: Black



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