

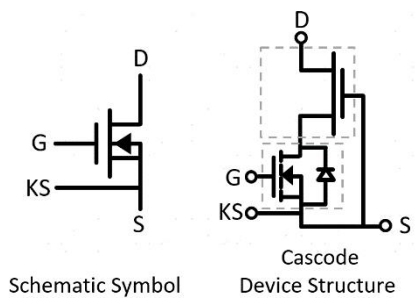
Features

- Easy to use, compatible with standard gate drivers
- Excellent $Q_G \times R_{DS(on)}$ figure of merit (FOM)
- Low Q_{RR} , no free-wheeling diode required
- Low switching loss
- RoHS compliant and Halogen-free
- Qualified according to JEDEC criteria

Product Summary		
V_{DSS}	650	V
$R_{DS(on), typ}$	50	m Ω
Q_G, typ	25	nC
$Q_{RR, typ}$	138	nC

Applications

- High efficiency power supplies
- Telecom and datacom
- Automotive
- Servo motors



Packaging

Part Number	Marking	Package	Packaging	Base QTY
CRNZ050C65H	NZ050C65H	TOLL	Tape and Reel	1800

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

Symbol	Parameter		Limit Value	Unit
I_D	Continuous drain current @ $T_C=25^\circ\text{C}$		43	A
	Continuous drain current @ $T_C=100^\circ\text{C}$		27	A
I_{DM}	Pulsed drain current @ $T_C=25^\circ\text{C}$ (pulse width: 100us)		136	A
	Pulsed drain current @ $T_C=150^\circ\text{C}$ (pulse width: 100us)		95	A
V_{DSS}	Drain to source voltage ($T_J = -55^\circ\text{C}$ to 150°C)		650	V
V_{TDSS}	Transient drain to source voltage ^a		800	V
V_{GSS}	Gate to source voltage		± 20	V
P_D	Maximum power dissipation @ $T_C=25^\circ\text{C}$		179	W
T_C	Operating temperature	Case	-55 to 150	$^\circ\text{C}$
T_J		Junction	-55 to 150	$^\circ\text{C}$
T_S	Storage temperature		-55 to 150	$^\circ\text{C}$
T_{CSOLD}	Soldering peak temperature		260	$^\circ\text{C}$

Thermal Resistance

Symbol	Parameter	Typical	Unit
$R_{\Theta JC}$	Junction-to-case	0.7	° C/W
$R_{\Theta JA}$	Junction-to-ambient ^b	50	° C/W

Notes:

a. Off-state spike duty cycle < 0.01, spike duration < 2μs

b. Device on one layer epoxy PCB for drain connection (vertical and without air stream cooling, with 6cm² copper area and 70μm thickness)

Electrical Parameters, at $T_J=25^\circ\text{C}$, unless otherwise specified

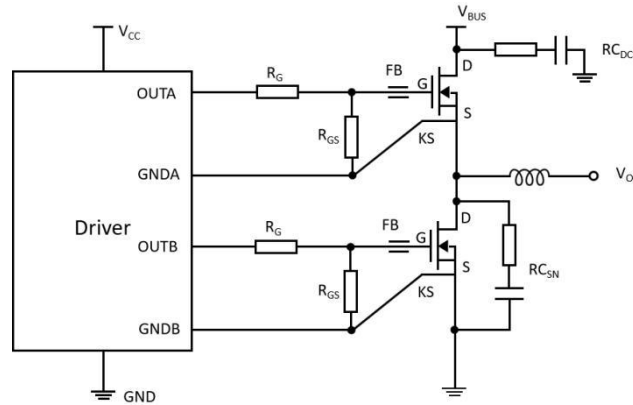
Symbol	Min	Typ	Max	Unit	Test Conditions
Forward Characteristics					
V _{DSS-MAX}	650	-	-	V	V _{GS} =0V
BV _{DSS}	-	1000	-		V _{GS} =0V, I _{DSS} =250 μ A
V _{GS(th)}	3	4	5	V	V _{DS} =V _{GS} , I _D =500 μ A
ΔV _{GS(th)} /T _J	-	-10.7	-	mV/°C	
R _{DS(on)} ^c	-	50	65	m Ω	V _{GS} =12V, I _D =4A, T _J =25° C
	-	100	-		V _{GS} =12V, I _D =4A, T _J =150° C
I _{DSS}	-	20	40	μ A	V _{DS} =700V, V _{GS} =0V, T _J =25° C
	-	50	-	μ A	V _{DS} =700V, V _{GS} =0V, T _J =150° C
I _{GSS}	-	6	20	μ A	V _{GS} =20V
	-	-6	-20	μ A	V _{GS} =-20V
C _{ISS}	-	1451	-	pF	V _{GS} =0V, V _{DS} =400V, f=1MHz
C _{OSS}	-	106	-	pF	
C _{RSS}	-	1.4	-	pF	
C _{O(er)}	-	159	-	pF	V _{GS} =0V, V _{DS} =0 - 400V
C _{O(tr)}	-	346	-	pF	
Q _{oss}	-	138	-	nC	
Q _G	-	25		nC	V _{DS} =400V, V _{GS} =0 - 12V, I _D =26A
Q _{GS}	-	8.7	-		
Q _{GD}	-	4.4	-		
t _{D(on)}	-	36	-	ns	V _{DS} =400V, V _{GS} =0 - 12V, I _D =26A, R _G =33 Ω
t _R	-	30	-		
t _{D(off)}	-	100	-		
t _F	-	8	-		
Reverse Characteristics					
V _{SD}	-	1.2	-	V	V _{GS} =0V, I _S =13A, T _J =25° C
	-	1.7	-		V _{GS} =0V, I _S =26A, T _J =25° C
	-	2.2	-		V _{GS} =0V, I _S =26A, T _J =150° C
t _{RR}	-	43	-	ns	I _S =26A, V _{GS} =0V, d _i /d _t =1000A/us, V _{DD} =400V
Q _{RR}	-	138	-	nC	

Notes:

c. Dynamic on-resistance; see Figure 20 and 21 for test circuit and configurations

Circuit Implementation

Half bridge and full bridge topology



Recommended Half-bridge Circuit

Recommended gate drive: (0 V, 12 V)

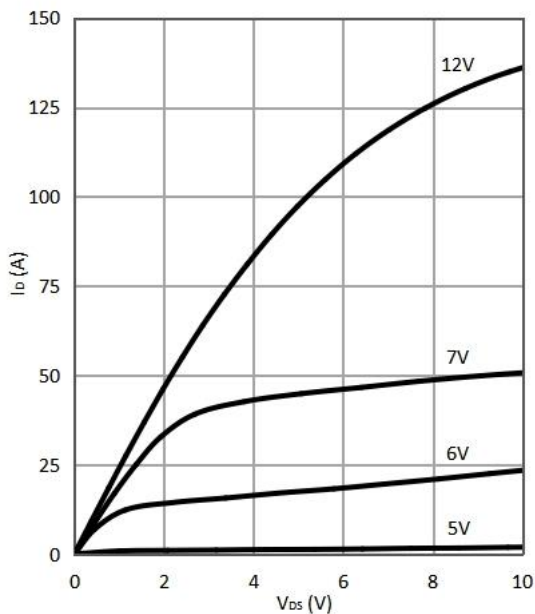
Gate Ferrite Bead (FB)	Gate Resistance (R_G)	Gate Source Resistance (R_{GS})	Switching RC Snubber (RC_{SN})	DC Link RC Snubber (RC_{DCL})
300 - 600 Ω @100MHz	33 Ω	10 k Ω	15 Ω + 470 pF	5 Ω + 4.7 nF

Notes:

- d. RC_{SN} should be placed as close as possible to the drain pin
- e. The layout and wiring of the drive circuit should be as short as possible

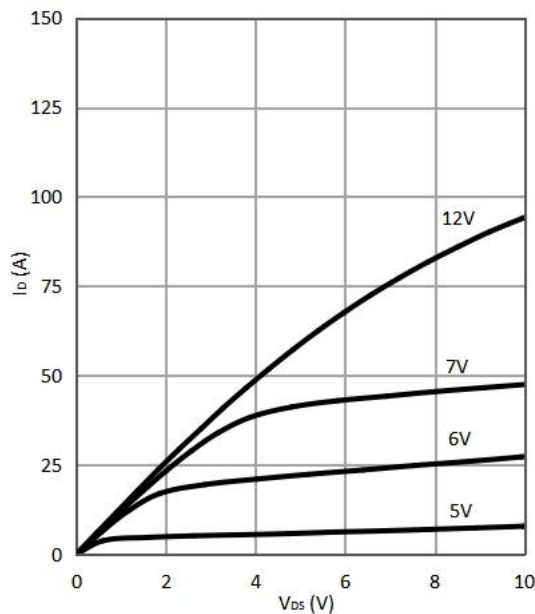
Typical Characteristics, at $T_C=25^\circ\text{C}$, unless otherwise specified

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



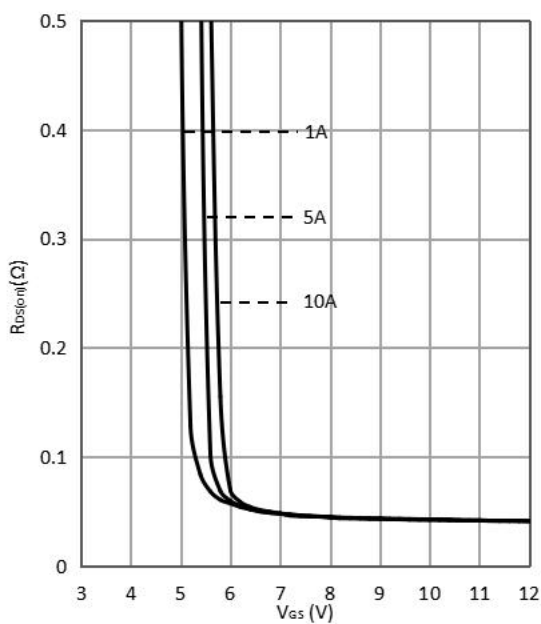
Parameter: V_{GS}

Figure 2. Typical Output Characteristics $T_J=150^\circ\text{C}$



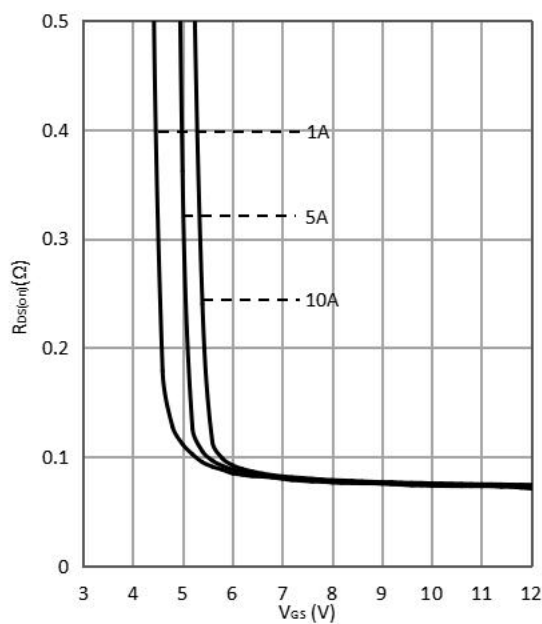
Parameter: V_{GS}

Figure 3. Typical Drain to Source On-resistance $T_J=25^\circ\text{C}$



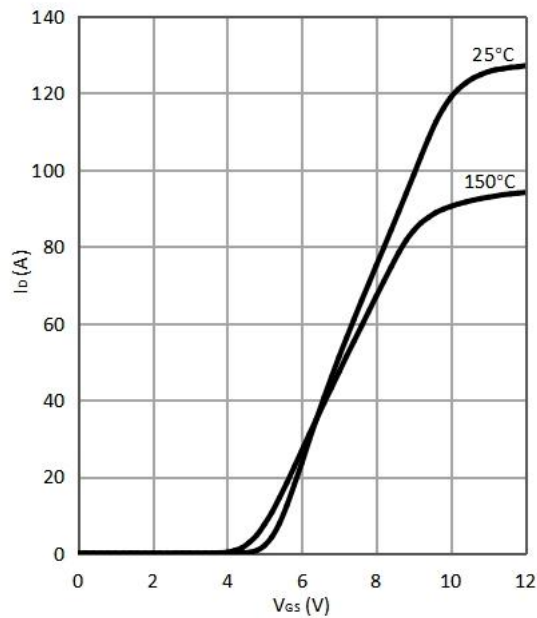
Parameter: I_D

Figure 4. Typical Drain to Source On-resistance $T_J=150^\circ\text{C}$



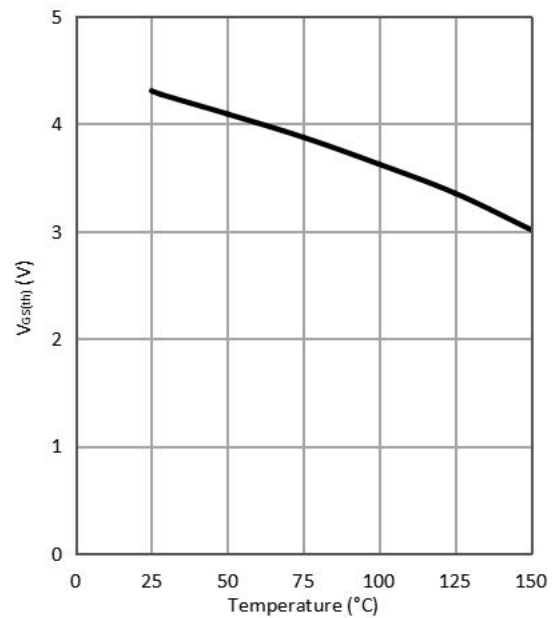
Parameter: I_D

Figure 5. Typical Transfer Characteristics



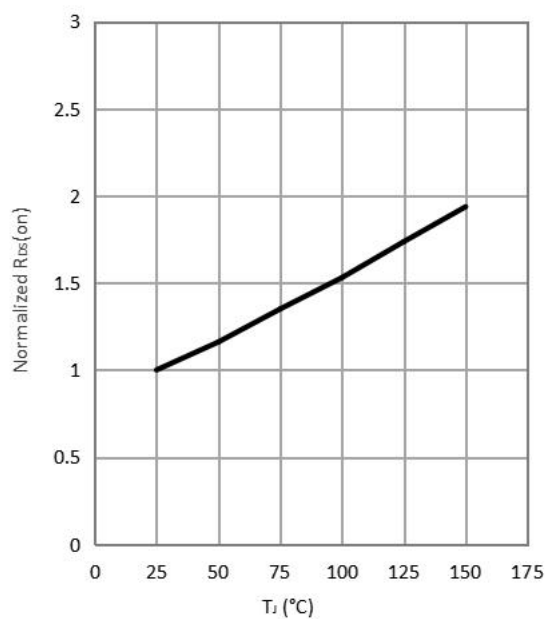
V_{DS}=10V, Parameter: T_J

Figure 6. V_{GS(th)} Vs Temperature Characteristics



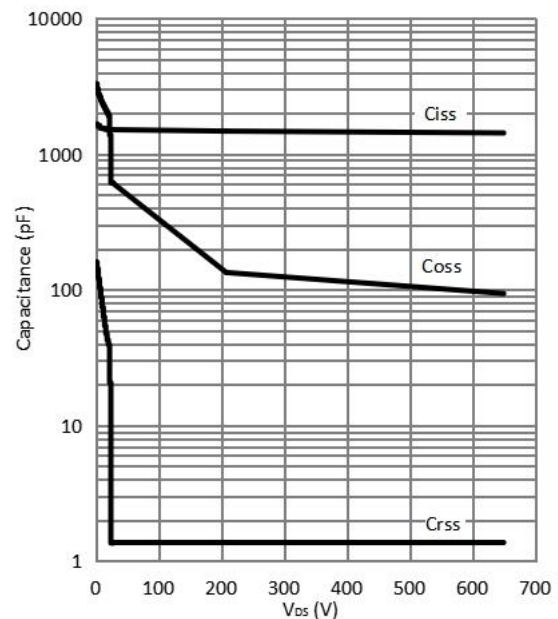
I_D=500uA

Figure 7. Normalized On-resistance



I_D=4A, V_{GS}=12V

Figure 8. Typical Capacitance



V_{GS}=0V, f=1MHz

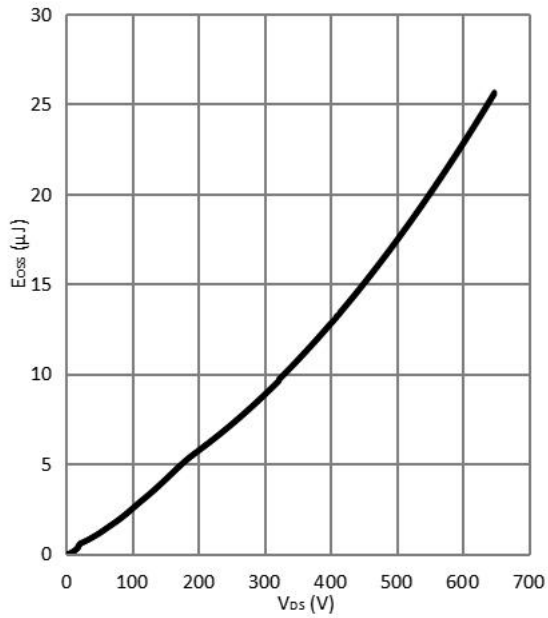
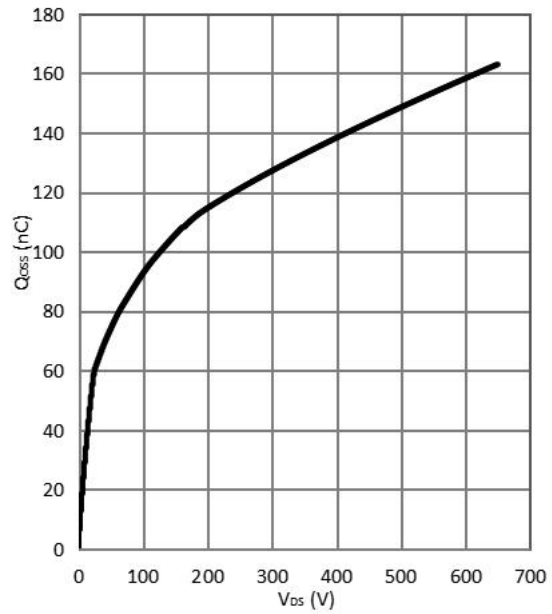
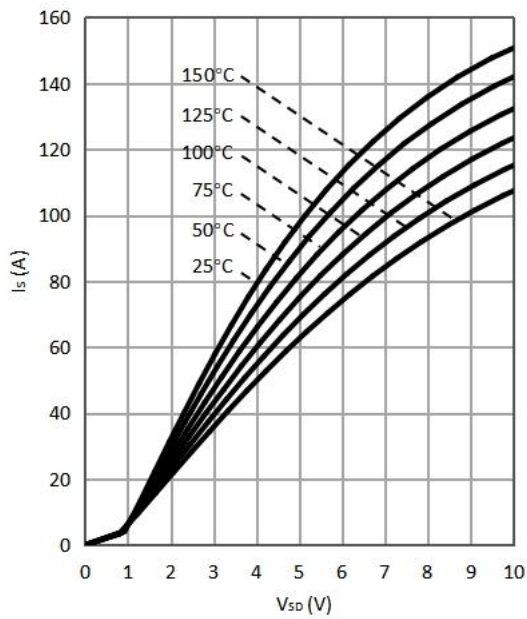
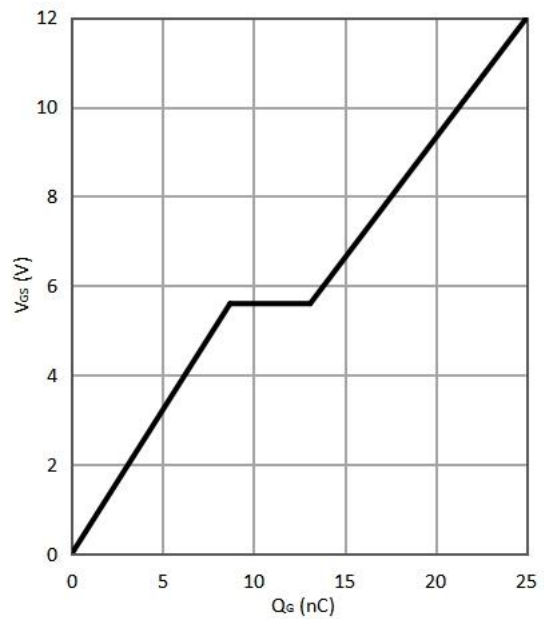
Figure 9. Typical Coss Stored Energy

 $V_{GS}=0V, f=1MHz$
Figure 10. Typical Qoss

 $V_{GS}=0V, f=1MHz$
Figure 11. Forward Characteristic of Rev. Diode

 $I_S=f(V_{SD}), \text{Parameter } T_J$
Figure 12. Typical Gate Charge

 $I_{DS}=26A, V_{DS}=400V$

Figure 13. Power Dissipation

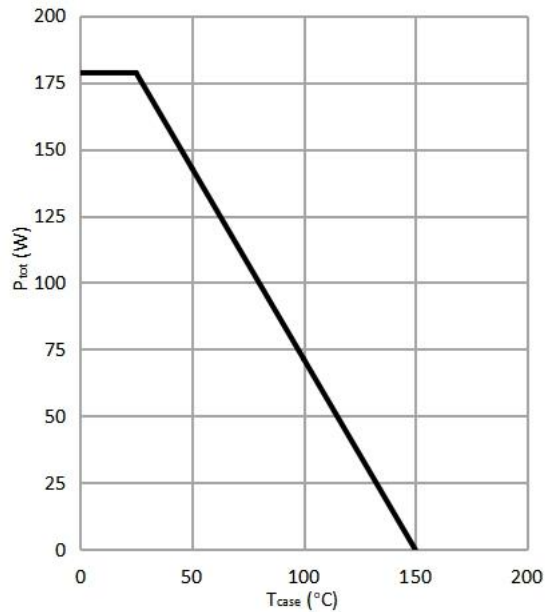


Figure 14. Current Derating

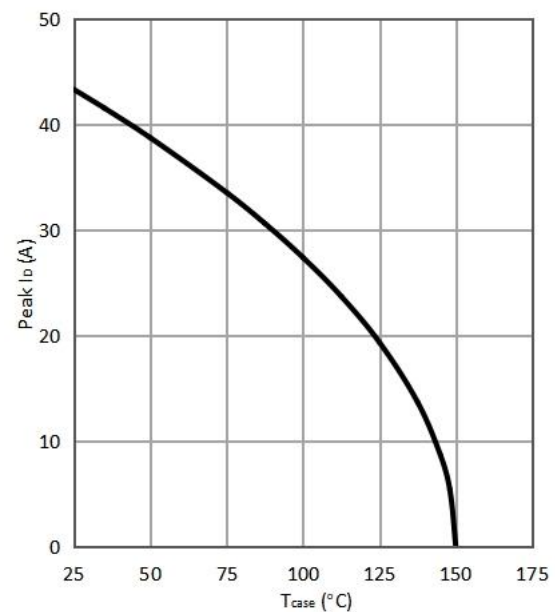


Figure 15. Transient Thermal Resistance

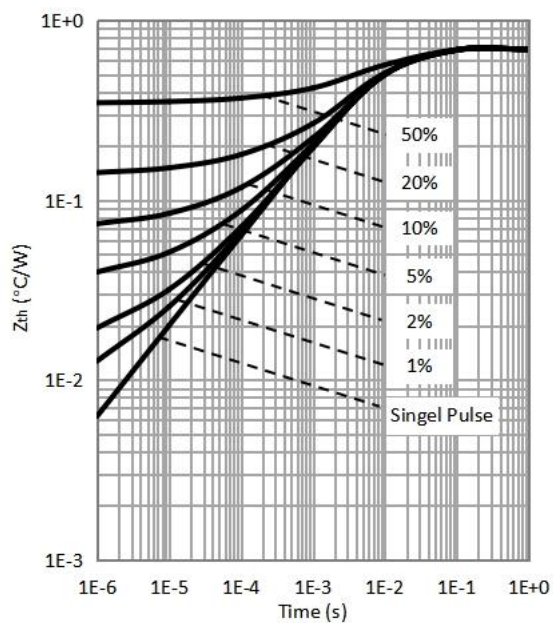
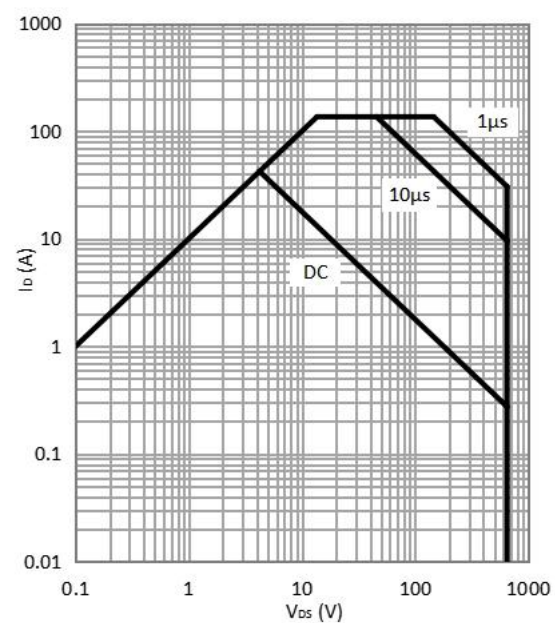
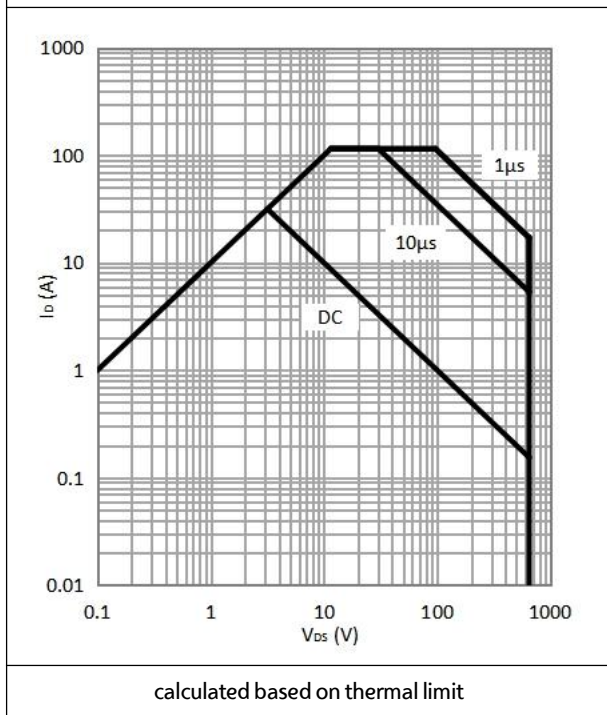


Figure 16. Safe Operating Area T_c=25° C

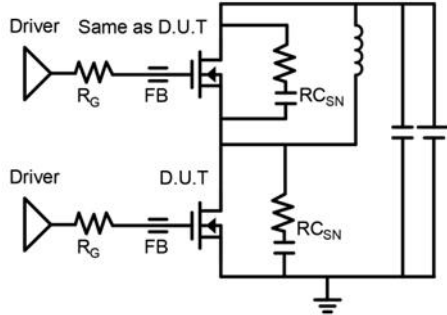
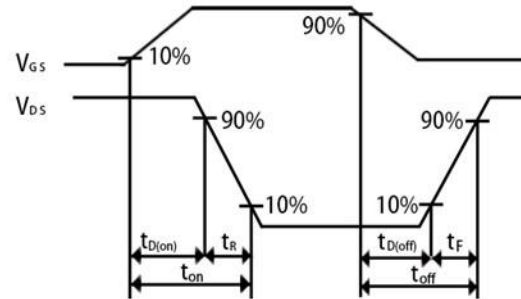
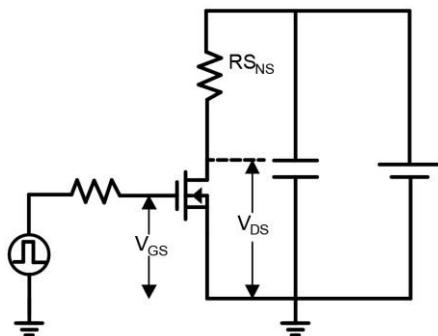
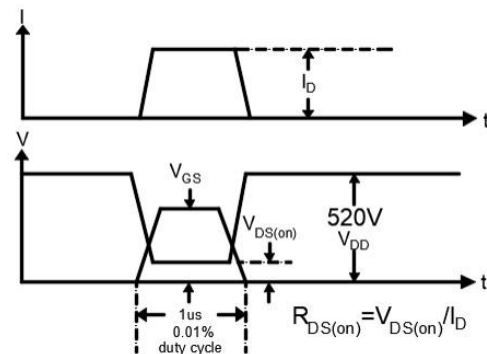
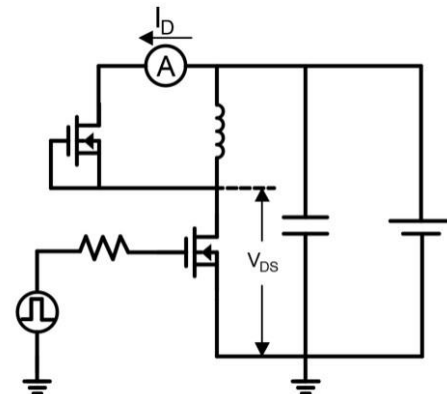
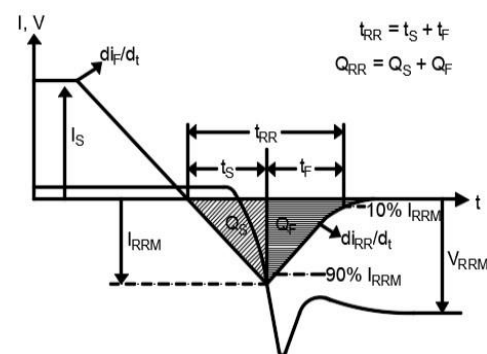


calculated based on thermal limit

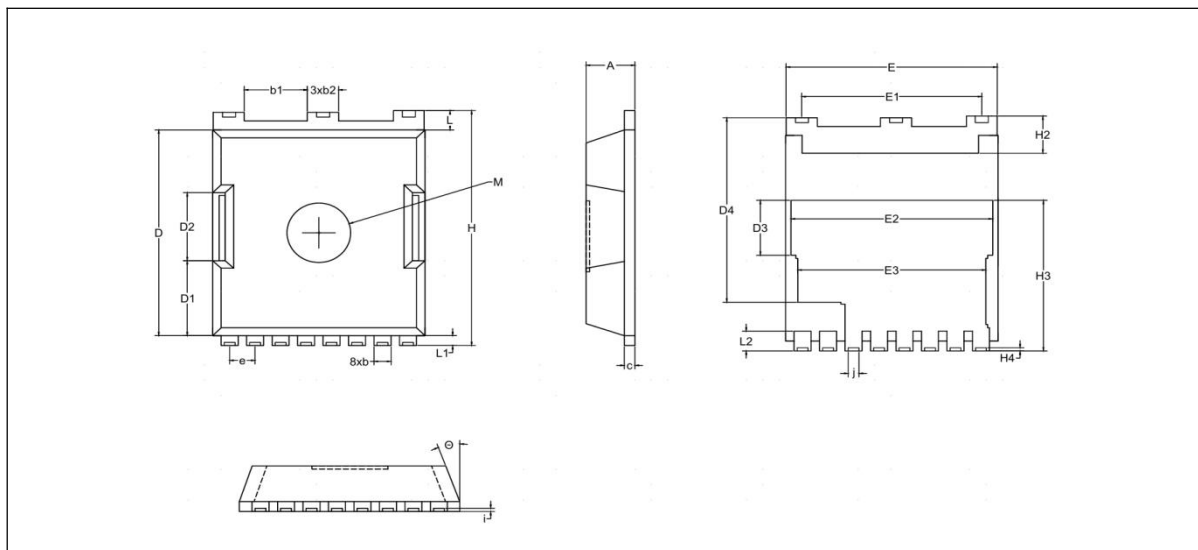
Figure 17. Safe Operating Area $T_C=80^\circ\text{C}$



Test Circuits and Waveforms

Figure 18. Switching Time Test Circuit

Figure 19. Switching Time Waveform

Figure 20. Dynamic $R_{DS(on)}$ Test Circuit

Figure 21. Dynamic $R_{DS(on)}$ Waveform

Figure 22. Diode Characteristic Test Circuits

Figure 23. Diode Recovery Waveform


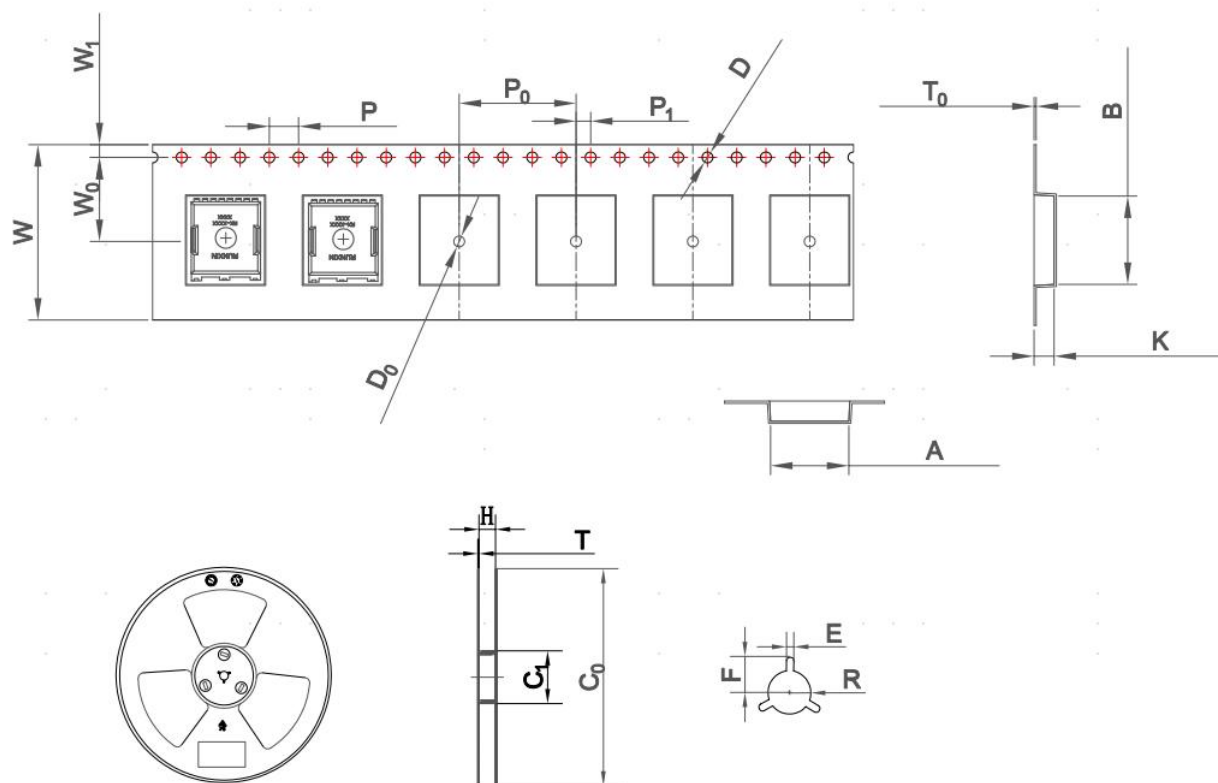
Package Outline



SYMBOL	Millimeter		
	Min	Nom	Max
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	3.00	3.10	3.20
b2	1.10	1.20	1.30
c	0.40	0.50	0.60
D	10.28	10.38	10.58
D1	4.18REF		
D2	3.30 REF		
D3	2.77REF		
D4	9.03REF		
E	9.70	9.90	10.10
E1	8.50REF		
E2	9.40REF		
E3	8.50REF		
e	1.10	1.20	1.30
H	11.48	11.68	11.88
H2	1.10	1.20	1.30
H3	7.50	7.60	7.70
H4	0.13	0.23	0.33
i	0.10	-	-
j	0.42	0.45	0.50
L	0.50	0.70	0.90
L1	0.50	0.60	0.70
L2	1.05	1.20	1.30
M	3REF		
e	10° REF		

Tube Information

Dimensions are shown in millimeters



Tape Dimension(mm)					
W	24±0.1	P	4±0.1	A	10.7±0.1
W ₀	11.5±0.1	P ₀	16±0.1	B	12.1±0.1
W ₁	1.75±0.1	P ₁	2±0.1	D ₀	1.5±0.1
K	2.75±0.1	D	1.5±0.1	T ₀	0.30±0.03

Reel Dimension(mm)			
H	26±0.1	F	10.5±0.1
T	2±0.2	E	2.8±0.1
C ₀	330±3	R	6.5±0.1
C ₁	100±1		

Revision History

Version	Date	Change(s)
0.1	2025/08/31	Release preliminary datasheet

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.