

N-channel Enhancement Mode Power MOSFET

Features

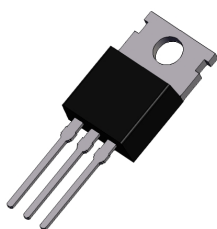
- Very Low On-resistance $R_{DS(ON)}$
- Low C_{rss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

Product Summary

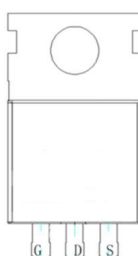
Parameters	Value	Unit
V_{DSS}	100	V
$V_{GS(th_Typ)}$	3.0	V
$I_D(@V_{GS}=10V)$	120	A
$R_{DS(ON)_Typ} @V_{GS}=10V$	4.4	m Ω

Applications

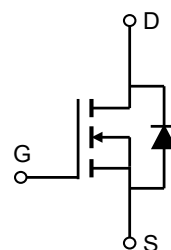
- PWM Application
- Load Switch
- Power Management



TO-220C Top View



Marking



Schematic Diagram

Ordering Information

Device	Marking	Package	Packing	Reel Size	Tape Width	Reel (pcs)
ZK100G120P	100G120	DFN5x6	Reel	N/A	N/A	5000

MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}\text{C}$	I_D	120	A
	$T_C = 100^{\circ}\text{C}$		95	
Pulsed Drain Current		I_{DM}	480	A
Single Pulsed Avalanche Energy		E_{AS}	369	mJ
Power Dissipation		P_D	190	W
Thermal Resistance Junction to Case		$R_{\theta JC}$	0.66	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to ambient		$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^{\circ}\text{C}$

MOSFET ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	V _{(BR) DSS}	V _{GS} = 0V, I _D = 250uA	100			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 100V, V _{GS} =0V			1.0	μA
Gate-body leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} =±20V			±100	nA
On characteristics ④						
Gate-threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2.0	3.0	4.0	V
Static drain-source on-sate resistance	R _{DS(on)}	V _{GS} =10V, I _D =30A		4.4	5.5	mΩ
Dynamic characteristics ④ ⑤						
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f =500kHz		3064		pF
Output capacitance	C _{oss}			1612		
Reverse transfer capacitance	C _{rss}			69		
Switching characteristics ④ ⑤						
Total gate charge	Q _g	V _{GS} =0 to 10V V _{DS} =50V, I _D =50A		43		nC
Gate-source charge	Q _{gs}			14		
Gate-drain charge	Q _{gd}			9		
Turn-on delay time	t _{d(on)}	V _{DS} =50V, I _D =20A V _{GS} =10V, R _{GEN} =3Ω		18		ns
Turn-on rise time	t _r			26		
Turn-off delay time	t _{d(off)}			28		
Turn-off fall time	t _f			10		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =20A			0.81	V
Continuous drain-source diode forward current	I _S	T _C =25 ℃			120	A
Pulsed Drain-Source Diode Forward Current	I _{SM}				480	A
Reverse recovery time	t _{rr}	di/dt = 100A/μs, I _F = 20A		59		ns
Reverse recovery charge	Q _{rr}			85		nC

Notes:

- 1.Repetitive Rating : Drain current limited by wire bond.
- 2.EAS condition: $T_J = 25^\circ\text{C}$, $V_{DD} = 50V$, $V_{GS} = 10V$, $L = 0.5mH$, $I_{AS} = 38.4A$
- 3.These curves are based on the junction-to-case thermal impedance R_{thjc} , assuming maximum junction temperature is 150°C . These curves provide a single pulse rating.

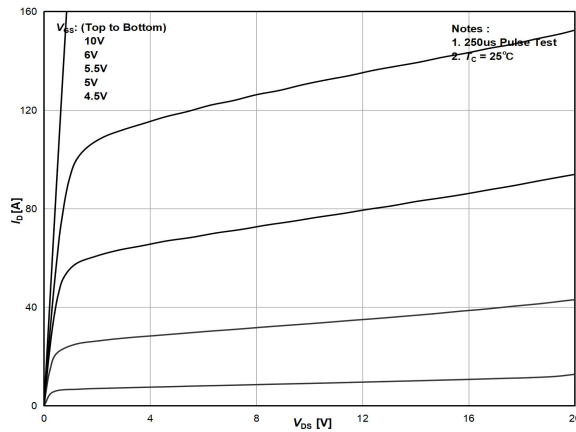


Figure 1. On-Region Characteristics

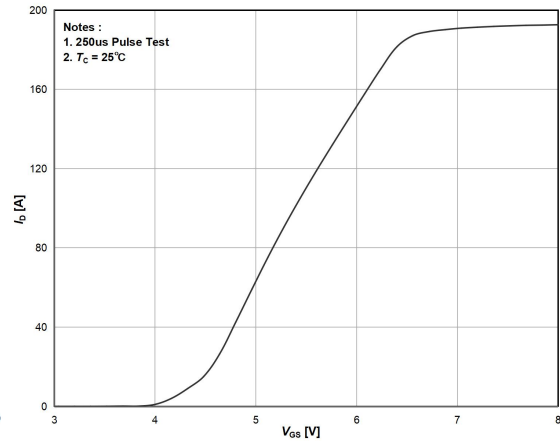


Figure 2. Transfer Characteristics

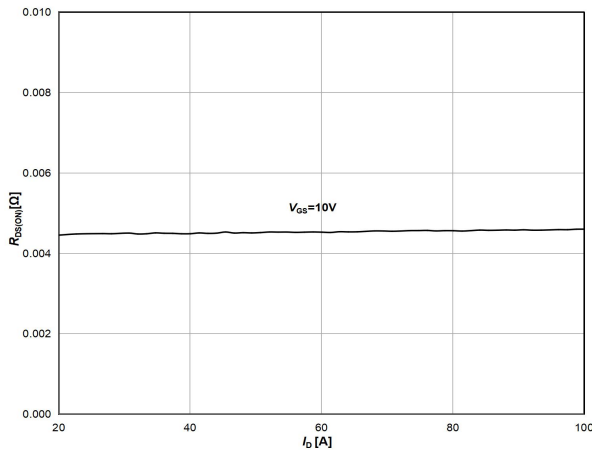


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

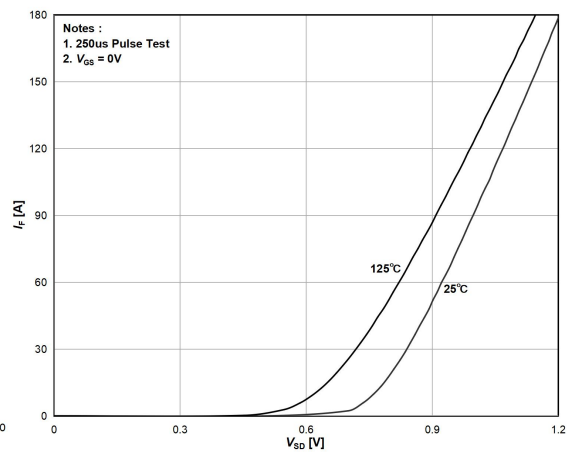


Figure 4. Body Diode Forward Voltage Variation with Current

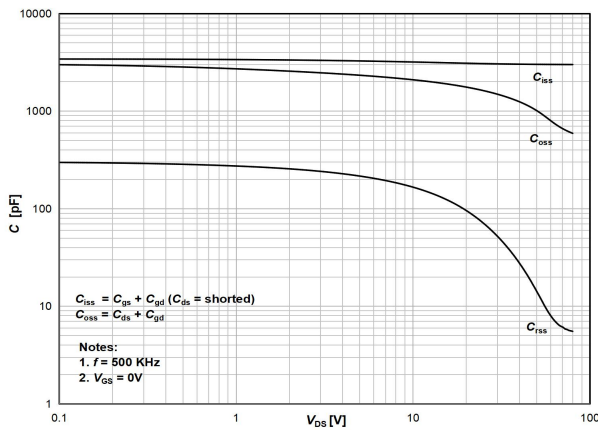


Figure 5. Capacitance Characteristics

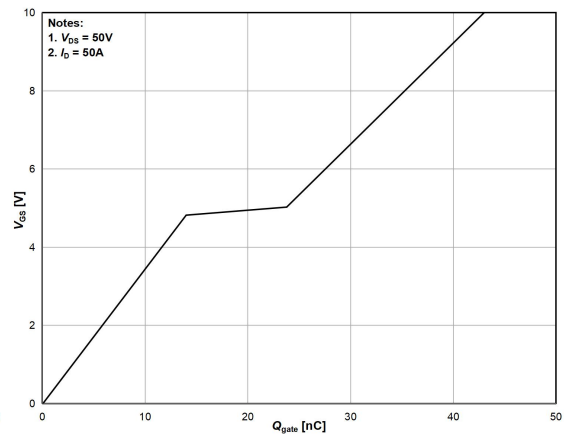


Figure 6. Gate Charge Characteristics

Typical Electrical & Thermal Characteristics

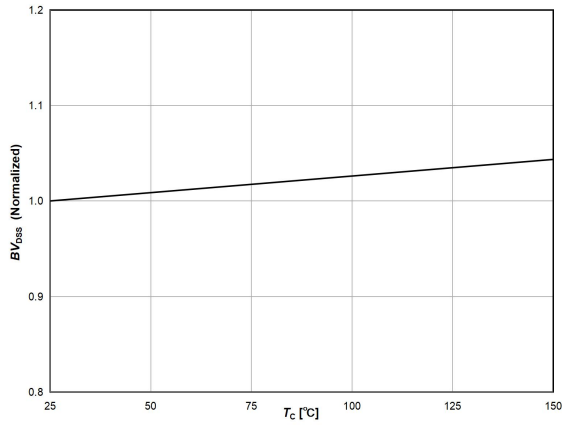


Figure 7. Breakdown Voltage Variation vs Temperature

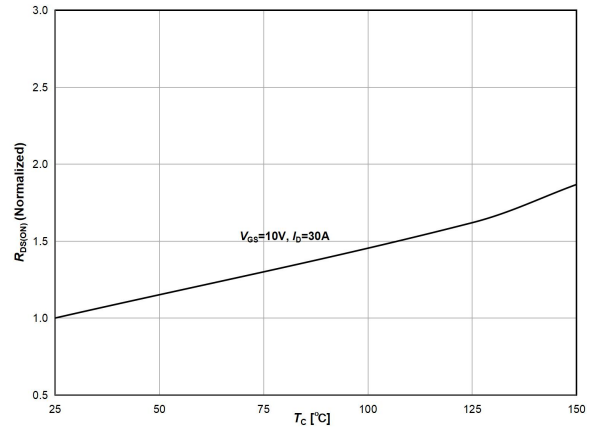


Figure 8. On-Resistance Variation vs Temperature

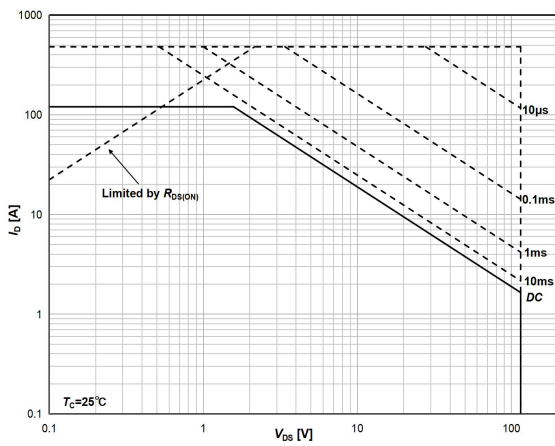


Figure 9. Maximum Safe Operating Area³⁾

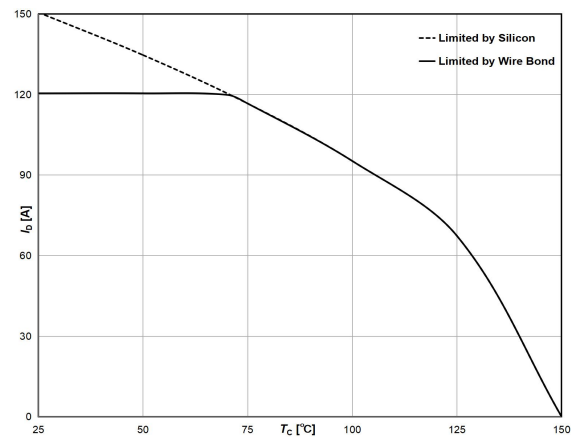


Figure 10. Maximum Drain Current vs Case Temperature

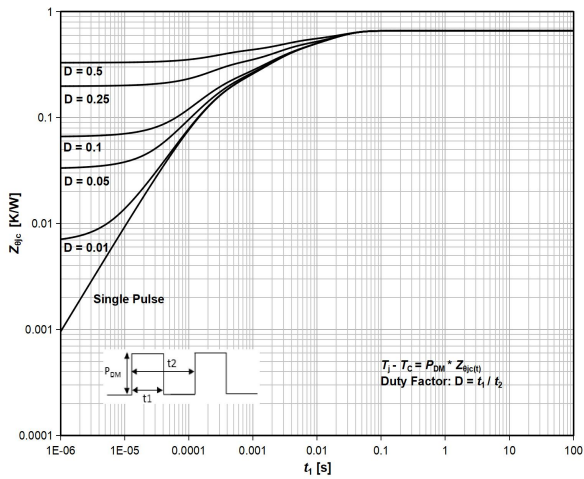
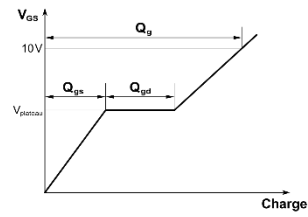
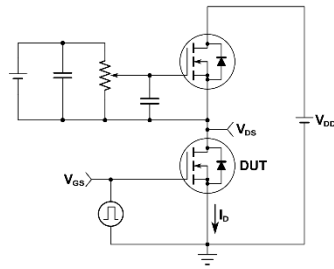
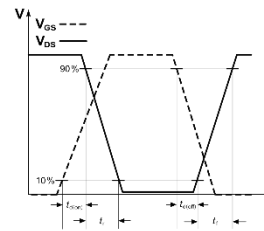
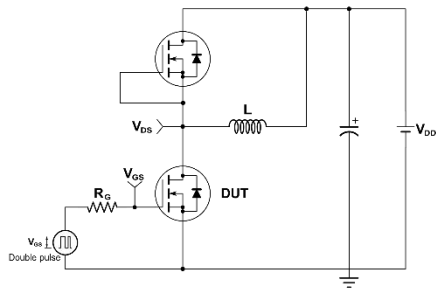


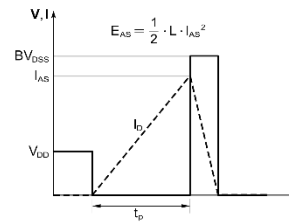
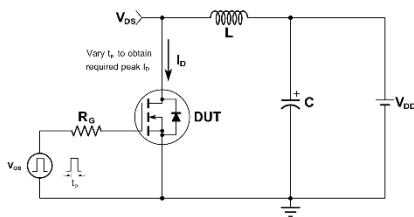
Figure 11. Transient Thermal Response Curve



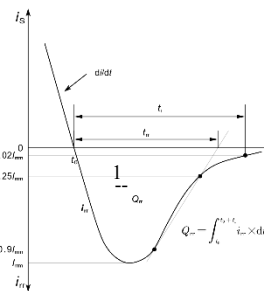
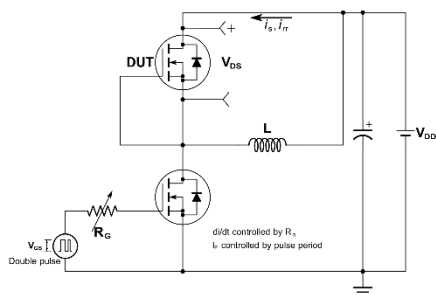
Gate charge test circuit & waveform



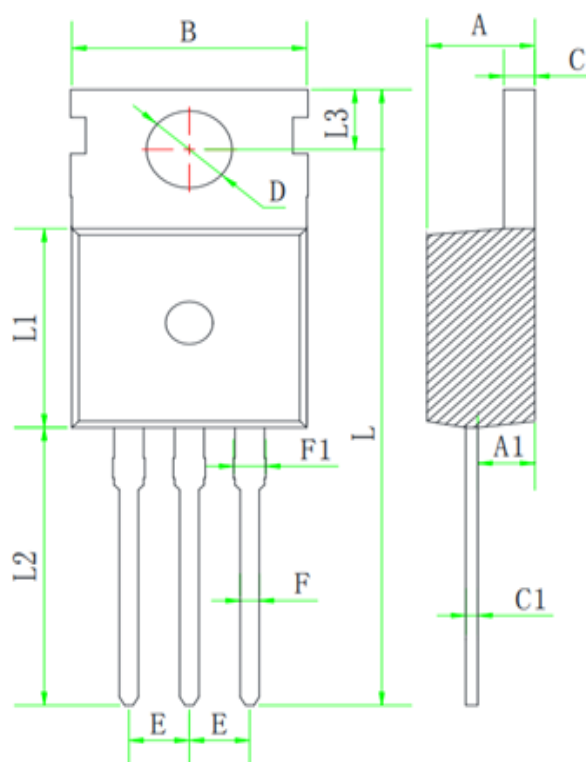
Switching times for inductive load test circuit & waveform



Unclamped inductive load test circuit & waveform



Diode characteristics test circuit & waveform



Symbol	Min	Typ	Max
A	4.43	4.53	4.63
A1	2.30	2.40	2.50
B	9.90	10.0	10.10
C	1.25	1.30	1.40
C1	0.45	0.50	0.60
D	3.50	3.60	3.70
E	2.44	2.54	2.64
F	0.70	0.80	0.95
F1	1.20	1.35	1.50
L	26.80	28.80	30.80
L1	9.20	9.30	9.40
L2	12.90	13.10	13.30
L3	2.70	2.80	2.90