



SKGM18N65-T

GaN Power Transistor

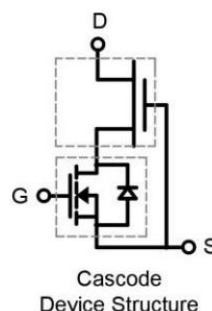
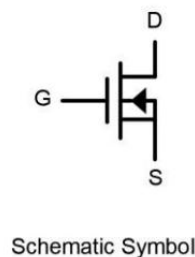
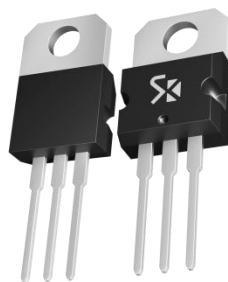
Features

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

Applications

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

Key Performance Parameters at $T_{JC}=25^{\circ}C$		
Parameters	Values	Units
$V_{DS,max}$	650	V
$R_{DS(on),max}$	225	m Ω
$Q_{G,typ}$	20	nC
$I_{D,Pulse}$	57	A
$Q_{rr,typ}$	26	nC



Absolute Maximum Ratings(at $T_C=25^{\circ}C$ unless otherwise specified.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Drain-source voltage	$V_{DS,max}$	$T_J = -55^{\circ}C$ to $150^{\circ}C$	650			V
Drain-source voltage transient	$V_{DS,transient}$	$V_{GS}=0V, V_{DS}=800V$	800			V
Continuous current, drain-source	I_D	$T_C=25^{\circ}C$			13	A
		$T_C=100^{\circ}C$			8	A
Pulsed current, drain-source	$I_{D,pulse}$	$T_C=25^{\circ}C, (pulse\ width: 10\mu s)$			57	A
		$T_C=150^{\circ}C, (pulse\ width: 10\mu s)$			42	A
Gate-source voltage, continuous	V_{GS}		-20		+20	V
Power dissipation	P_D	$T_C=25^{\circ}C$			50	W
Operating temperature	T_C	Case	-55		150	$^{\circ}C$
	T_J	Junction	-55		150	$^{\circ}C$
Storage temperature	T_{STG}		-55		150	$^{\circ}C$



Thermal Characteristics

Parameter	Symbol	Notes/Test Condition	Values			Unit
			Min	Typ	Max	
Thermal Resistance, Junction to Case	$R_{\theta JC}$				2.5	°C/W
Thermal Resistance, Junction to Ambient ²	$R_{\theta JA}$				50	°C/W
Reflow soldering temperature	T_{SOLD}				260	°C

- Off-state spike duty cycle < 0.01, spike duration < 2us
- Device on one layer epoxy PCB for drain connection (vertical and without air stream cooling, with 6cm² copper area and 70μm thickness)

Electrical Characteristics(at $T_J = 25\text{ }^{\circ}\text{C}$, unless specified otherwise.)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source voltage	V _{DS,max}	V _{GS} =0V	650			V
Drain-source voltage transient	BV _{DSS}	V _{GS} =0V,I _{DSS} =250uA		1000		V
Gate Threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =500μA,T _J =25°C	3	4	5	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =700V, V _{GS} =0V,T _J =25°C		5	20	μA
		V _{DS} =700V,V _{GS} =0V,T _J =150°C		50		μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±150	nA
Static Drain to Source on resistance ¹	R _{DS(on)}	V _{GS} = 8V, I _D =4A,T _J =25°C		180	225	mΩ
		V _{GS} = 8V, I _D =4A,T _J =125°C		360		mΩ
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =400V,V _{GS} =0V, f=1MHz		596		pF
Output Capacitance	C _{oss}			29		pF
Reverse transfer capacitance	C _{rss}			1		pF



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Effective output capacitance,energy related	C _{O(er)}	V _{DS} =0V to 400V,V _{GS} =0V		45		pF
Effective output capacitance,time related	C _{O(tr)}			110		pF
Turn-On Delay Time	t _{d(on)}	V _{DS} =400V,V _{GS} =0V to 12 V,I _D =3A R _G =30Ω		43		nS
Turn-Off Delay Time	t _{d(off)}			39		nS
Turn-On Rise Time	t _r			15		nS
Turn-Off Fall Time	t _f			11		nS
Gate charge characteristics						
Gate charge	Q _G	V _{GS} = 0 to 12 V, V _{DS} = 400 V, I _D = 5.5 A		20		nC
Gate-source charge	Q _{GS}			7		nC
Gate-drain charge	Q _{GD}			4		nC
Reverse conduction characteristics						
Source-drain reverse voltage	V _{SD}	V _{GS} = 0 V,I _{SD} = 2 A,T _J =25°C		1.3		V
		V _{GS} = 0 V,I _{SD} = 5A,T _J =25°C		1.9		V
		V _{GS} = 0 V,I _{SD} = 5 A,T _J =150°C		3		V
Reverse recovery charge	Q _{rr}	I _{SD} = 3 A,V _{GS} = 0 V,di /dt=1000A/μs,V _{DD} = 400 V		26		nC
Reverse recovery time	t _{rr}			16		ns

1. Dynamic on-resistance; see Figure 17 and 18 for test circuit and configurations.



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Electrical Characteristics Diagrams(at $T_C = 25\text{ }^{\circ}\text{C}$, unless specified otherwise.)

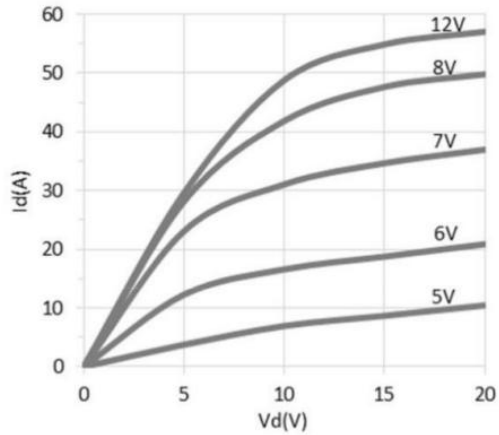


Figure 1. Typical Output Characteristics $T_J = 25^{\circ}\text{C}$

Parameter: V_{GS}

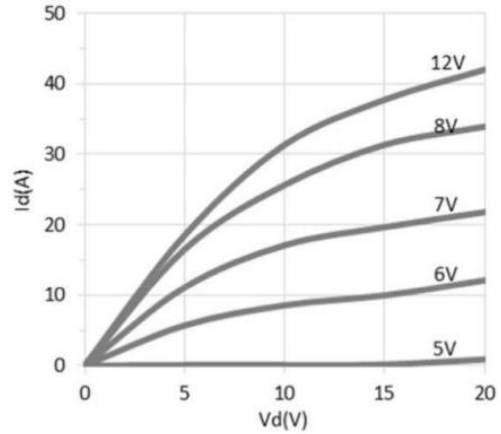


Figure 2. Typical Output Characteristics $T_J = 150^{\circ}\text{C}$

Parameter: V_{GS}

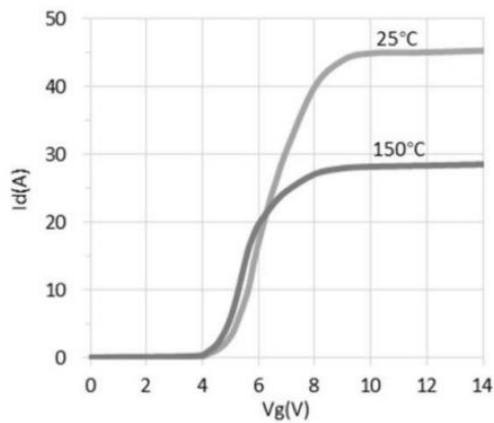


Figure 3. Typical Transfer Characteristics

$V_{DS} = 10\text{V}$, Parameter: T_J

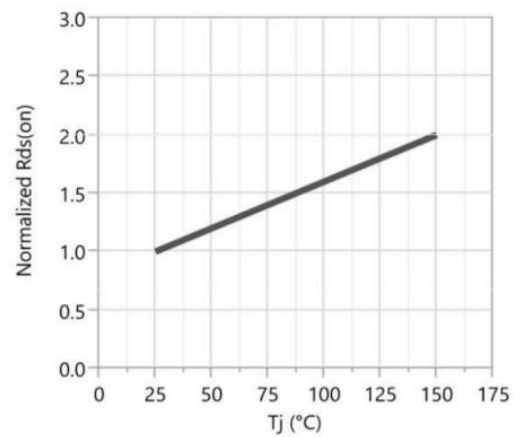


Figure 4. Normalized On-resistance

$I_D = 4\text{A}$, $V_{GS} = 8\text{V}$

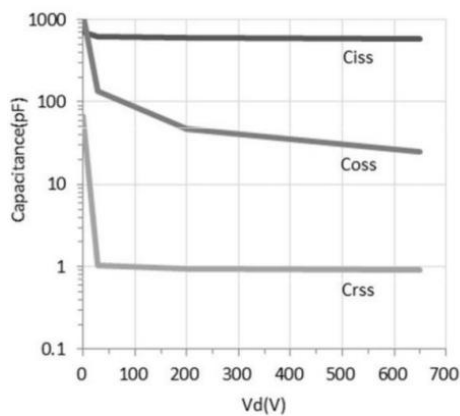


Figure 5. Typical Capacitance

$V_{GS} = 0\text{V}$, $f = 1\text{MHz}$

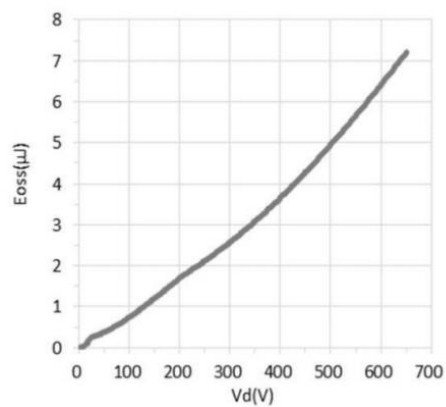


Figure 6. Typical C_{OSS} Stored Energy



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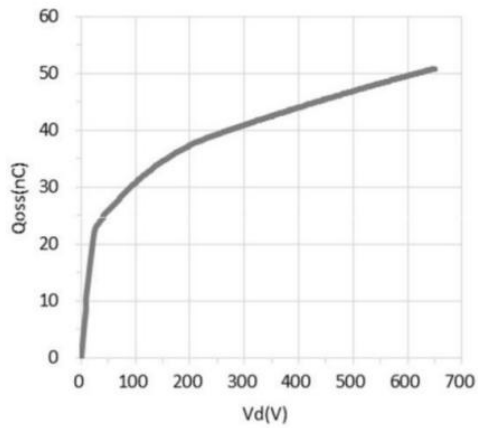


Figure 7. Typical Qoss

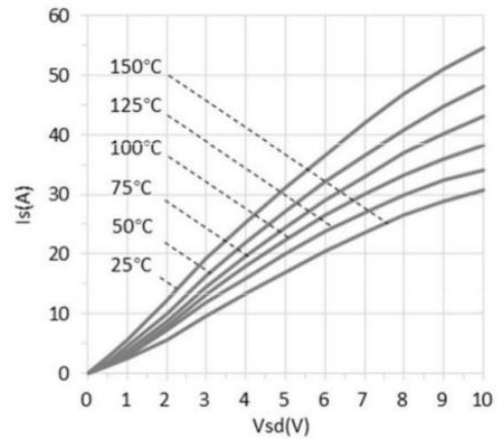


Figure 8. Forward Characteristic of Rev. Diode

$I_s = f(V_s)$, Parameter T_i

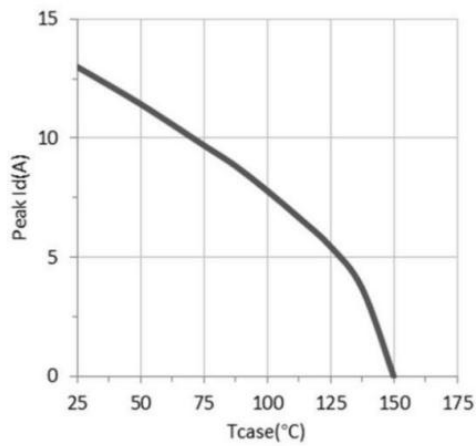


Figure 11. Current Derating

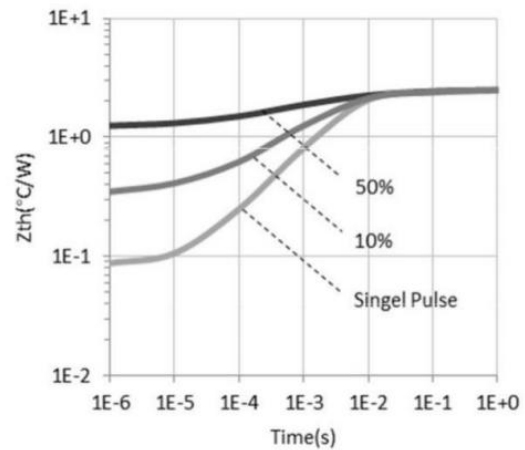


Figure 12. Transient Thermal Resistance

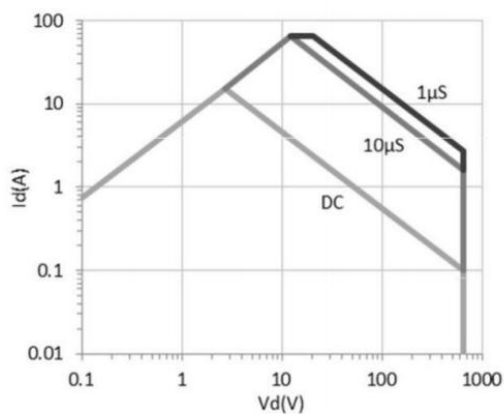


Figure 13. Safe operating Area $T_c=25\text{ }^{\circ}\text{C}$

(calculated based on thermal limits)

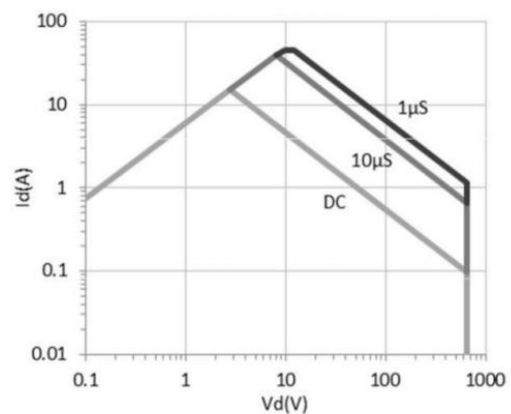


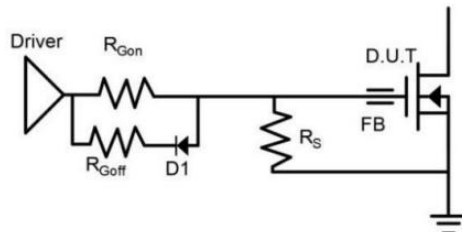
Figure 14. Safe operating Area $T_c=80\text{ }^{\circ}\text{C}$

(calculated based on thermal limits)



Circuit Implementation

Mostly used in flyback, forward and push-pull converters



Recommended Single Ended Drive Circuit

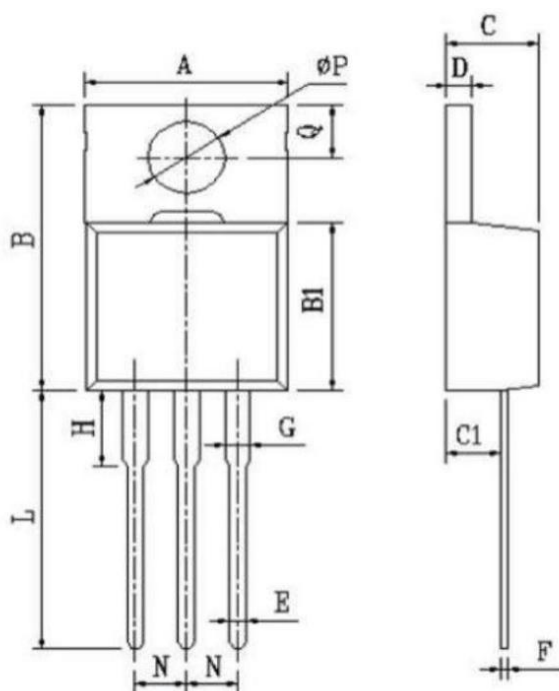
Recommended gate drive: (0 V, 12 V) with $R_{Gon} = 300 - 500 \Omega$, $R_{Goff} = 10 \Omega$

Gate Ferrite Bead (FB)	Gate Resistance (R_{Gon})	Gate Resistance (R_{Goff})	Gate Source Resistance (R_S)	Gate Diode (D1)
300 - 600 Ω @100 MHz	300 - 500 Ω	10 Ω	10 k Ω	1N4148

Package Information

TO-220

Dimensions in mm



COMMON DIMENSIONS		
SYMBOL	MM	
	MIN	MAX
A	10.1	10.5
B	15.2	15.6
B1	9.00	9.40
C	4.40	4.60
C1	2.40	3.00
D	1.20	1.40
E	0.70	0.90
F	0.30	0.50
G	1.17	1.37
H	3.30	3.80
L	13.1	13.7
N	2.34	2.74
Q	2.40	3.00
ΦP	3.70	3.90