GENERAL DESCRIPTION

DK130G70 integrates an E-MODE GaN-specific driver IC and a 700V 101mΩ GaN power transistor. It can replace traditional silicon-based MOSFETs or D-MODE GaN devices.

FEATURES

- Compatible with conventional PWM controllers
- Integrated 700V 101mΩ enhancement-mode GaN power transistor
- Wide gate input voltage range: 8V to 20V
- Self-powered technology, no external supply required
- Direct replacement for NMOS transistors
- Adjustable turn-on speed via external gate resistor
- Supports up to 500 kHz switching frequency
- Zero reverse recovery time
- DESAT protection

APPLICATIONS

- Flyback topology
- PFC topology
- LLC topology
- Fast chargers & adapters
- LED power supplies

MARKING DIAGRAMS

Marking	Note
DK	DK Semiconductor
#	Production test code includes space, "A~Z, *#Δ"
2501	1st batch of 2025
130G70	Product No.
FCT10	Ordering code
T01	IC code and small batch number,usually from 01 to 25

DK #2501

DK130G70

• FCT10 T01

Ordering code Definition

1st digit: Package	2nd digit: Controller Version	3rd digit: Integrated GaN Specs	4th digit: Pins	5th digit: Reserved
F:PDFN8*8	C: Main controller version is C	T: 700V/101mΩ	1	0: Reserved
N:PDFN5*6	G: Main controller version is G			
T:TO-220F				
K:TO252-4R			2	

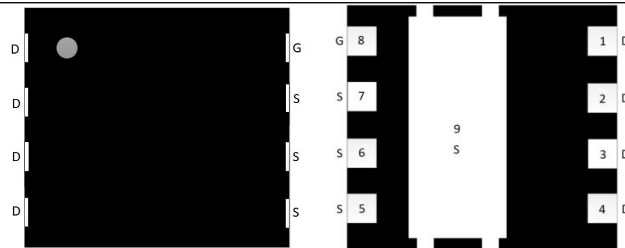
■ Ordering Information

Product No.	Ordering Code	Package	Integrated GaN Specs	Packaging form
DK130G70	FCT10	PDFN8*8	700V/101mΩ	2500pcs/Tray
DK130G70	NCT10	PDFN5*6	700V/101mΩ	5000pcs/Tray
DK130G70	TCT10	TO-220F	700V/101mΩ	1000pcs/Box
DK130G70	KCT20	TO252-4R	700V/101mΩ	4000pcs/Tray
DK130G70	FGT10	PDFN8*8	700V/101mΩ	2500pcs/Tray
DK130G70	NGT10	PDFN5*6	700V/101mΩ	5000pcs/Tray
DK130G70	TGT10	TO-220F	700V/101mΩ	1000pcs/Box
DK130G70	KGT20	TO252-4R	700V/101mΩ	4000pcs/Tray

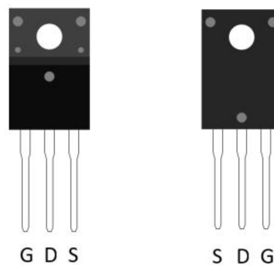
■ PIN CONFIGURATION

Pins name	Description
D	GaN drain
S	GaN source
G	Gate input

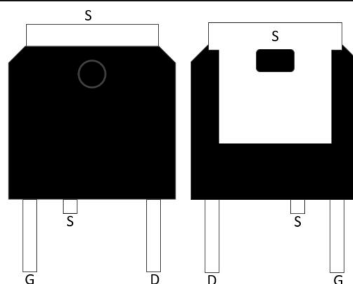
PDFN5*6/PDFN8*8



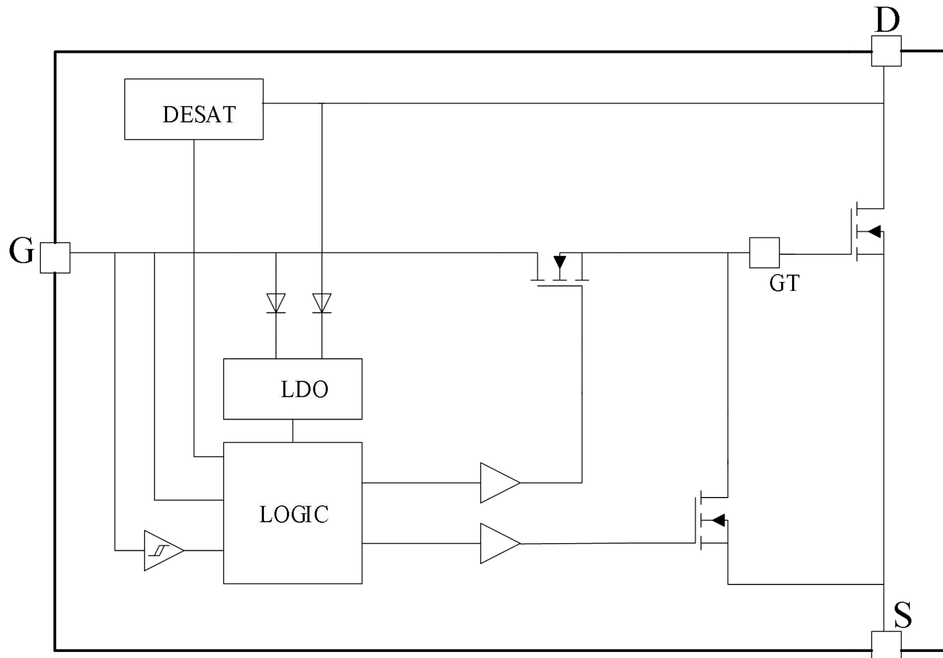
TO-220F



TO252-4R



BLOCK DIAGRAM



Key Performance Parameters(TA=25℃ Unless otherwise noted)

Symbol	Value	Unit
$V_{DS(max)}$	700	V
$R_{DS(on),(max)}$	130	mΩ
$I_{DS,Pulse}$	32	A
Q_{OSS} @ 400V	25.5	nC
Qrr	0	nC

■ Absolute Maximum Ratings (T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min	Max	Unit
Maximum drain-source voltage	$V_{DS(MAX)}$		-2	700	V
Drain-source transient voltage①	$V_{DS,Pulse}$			750	V
Saturation current②	I_{SAT}	TC = 125°C		10.5	A
Continuous drain current	I_D	TC = 25°C		16	A
Pulsed drain current	$I_{D,Pulse}$	10us @ TC = 25°C		32	A
Pulsed drain current	$I_{D,Pulse}$	10us @ TC = 125°C		18	A
Gate voltage	V_{GS}		-0.6	20	V
Gate transient voltage	$V_{GS,Pulse}$	100ns	-5	22	V
Power dissipation	PD_{MAX}	PDFN8*8		3	W
		PDFN5*6		2	
		TO-220F		33	
		TO252-4R		1.1	
Operating junction temperature	Tj		-55	150	℃
Thermal resistance (junction to case)	RθJC	PDFN8*8		4	℃/W
		PDFN5*6		5.5	
		TO-220F		3.8	
		TO252-4R		1.3	
Maximum junction temperature	$T_{J(MAX)}$			150	℃
Storage temperature range	T_{STG}		-40	150	℃
Soldering temperature	T_W			260	℃/10s
Human body model (HBM) ESD	HBM	Main controller C	±2000		V
		Main controller G	±1750		V
Charged device model (CDM) ESD	CDM		±1000		V

Note: Unless otherwise specified, all pins are referenced to the S-pin; Maximum ratings indicate that exceeding these limits may cause permanent damage to the device.Electrical characteristics define the DC and AC parameter specifications under guaranteed test conditions within the operating range. For parameters without specified limits, the specification does not guarantee their accuracy, but the typical values reasonably reflect device performance.

① VDS,Pulse allows:- Non-repetitive surge pulses <100μs (e.g., power-on, plug/unplug events)- Repetitive surge pulses <100ns (e.g., repetitive spikes caused by leakage inductance)

②: ISAT is the maximum saturation current of the GaN device at 125°C. The device's saturation current is inversely proportional to its temperature, so device temperature must be considered during use. Refer to the normalized current capability curve of the GaN device in the OPERATION DESCRIPTION section below for saturation current data conversion. The actual system current setting should be determined based on the chip's temperature.

Electrical Characteristics(Unless otherwise specified: TA = 25°C, VGS = 12V, VDS = 10V to 30V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-source leakage current	I_{DSS}	V_{DS}=700V；V_{GS}=0V；T_A = 25℃	-	0.6	37.5	uA
		V_{DS}=700V；V_{GS}=0V；T_A = 150℃	-	4	-	uA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=6V；I_D=5A；T_A = 25℃	-	101	130	mΩ
		V_{GS}=6V；I_D=5A；T_A = 150℃	-	230	-	mΩ
Gate threshold voltage	V_{GS_TH}		3.6	4	4.4	V
Gate quiescent current	I_{GON_Q}	V_{GS}=12V	110	135	160	uA
VGS operating voltage	V_{GS}		8		20	V
Turn-on propagation delay	T_{ON_PD}		50	75	100	ns
Turn-off propagation delay	T_{OFF_PD}		20	32	45	ns
DESAT protection threshold	V_{DS_DESAT}	Main controller version is C	3.5	3.9	4.4	V
		Main controller version is G	5.2	5.9	6.4	V
DESAT blanking time	t_{BLK_DESAT}		560	600	760	ns

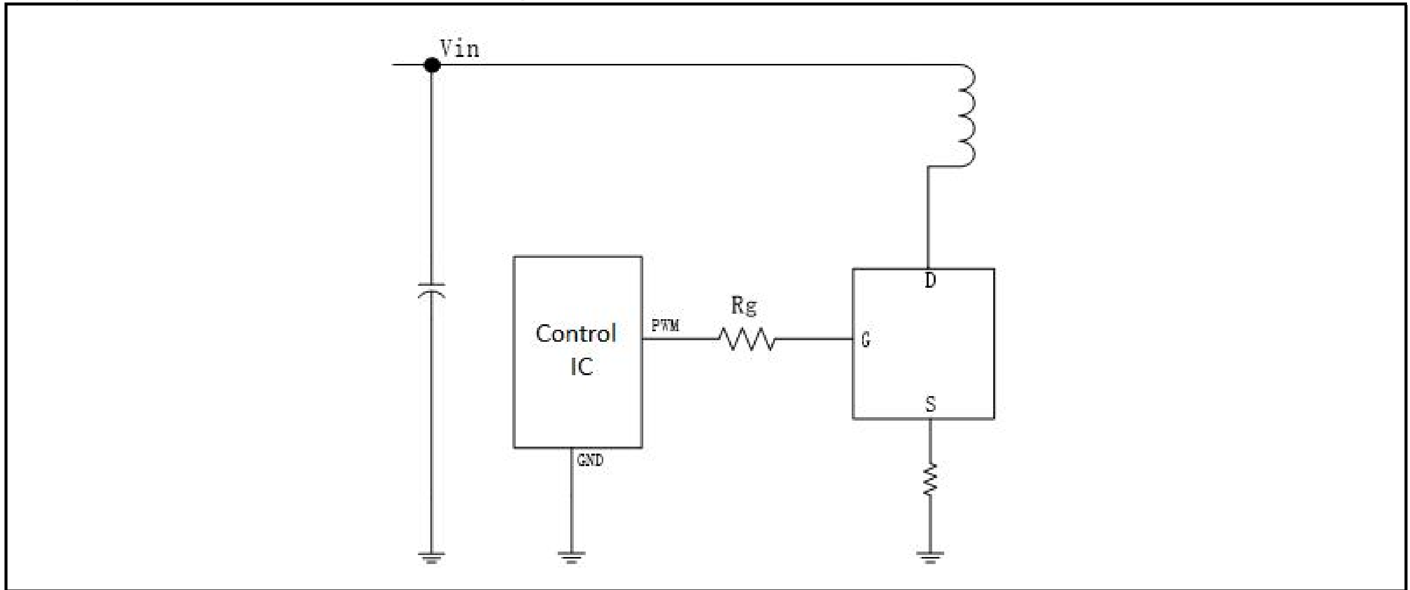
Dynamic Parameters (T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output capacitance	Coss	V_{GS}= 0 V；V_{DS}= 400V；f=100kHz	-	36.5	-	pF
Effective output capacitance, energy-related	Co(er)	VGS= 0 V；VDS= 0 to 400 V	-	49	-	pF
Effective output capacitance, time-related	Co(tr)	VGS= 0 V；VDS= 0 to 400 V	-	65	-	pF
Output charge	Qoss	VGS= 0 V；VDS= 0 to 400 V	-	25.5	-	nC

Reverse Conduction Characteristics(T_A=25℃ Unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-drain reverse voltage	V_{SD}	V_{GS}= 0 V；I_{SD}=5A	-	2.4	-	V
Reverse recovery charge	Qrr	ISD= 5 A；VDS= 400 V	-	0	-	nC

■ *Typical Application Circuit Diagram*



Note: When Rg>500Ω, it is recommended to connect a reverse parallel diode to accelerate turn-off speed.

■ *OPERATION DESCRIPTION*

1. Operating Principle

After initial power-up, the internal VDD of the chip is charged through the D/G pin until successful power-on.

- When the chip detects a high-level input at G, the GaN turns on while VDD is powered through the G pin.
- When G input goes low, the GaN turns off. The D pin voltage then rises, and VDD is powered through D pin.

2. V_{GS} Startup and Shutdown Thresholds

GaN turns on immediately when V_{GS} > 4V. If V_{GS} high level is < 4.4V, GaN turns on after a delay (prevents false triggering from V_{GS} noise). Lower V_{GS} causes longer delays. Internal shutdown when V_{GS} < 3.6V.

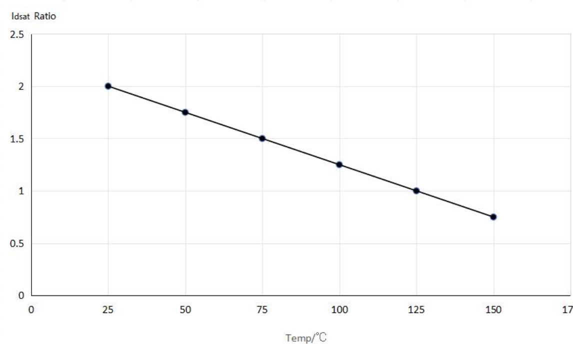
3. DESAT Protection

When GaN exceeds $I_{D,Pulse}$, DK130G70's internal driver instantly shuts off GaN to prevent saturation and ensure reliability.

Only one series resistor at G pin is needed to adjust turn-on speed (optimizes EMI). Turn-off speed is internally self-adaptive and unaffected by external adjustments.

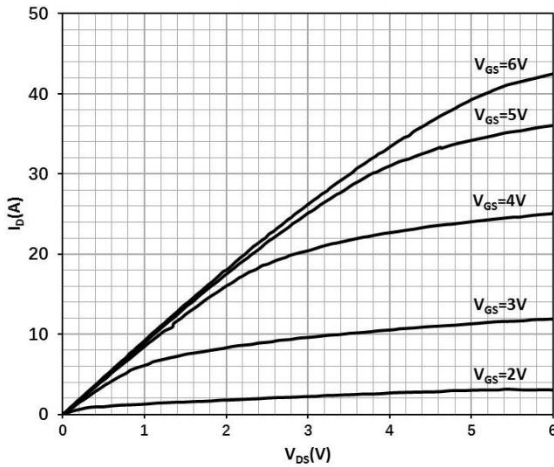
4. GaN Current Capability

Temperature significantly affects GaN's current capability. The normalized current vs. junction temperature (T_J) curve uses T_J=125°C as reference. Derate current capability based on actual TJ.

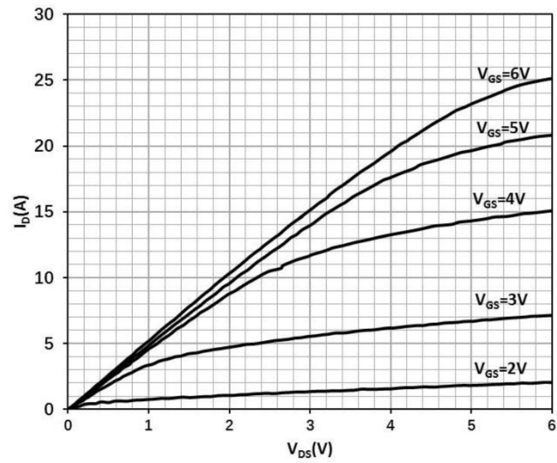


GaN Device Electrical characteristic curves

Typical output characteristic curve

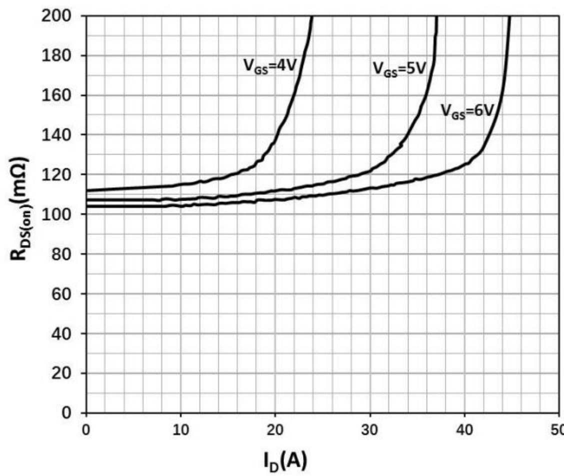


$I_D=f(V_{DS},V_{GS})$; $T_j=25°C$

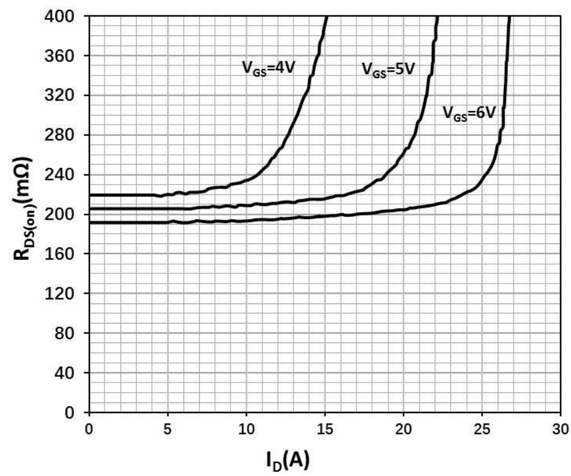


$I_D=f(V_{DS},V_{GS})$; $T_j=125°C$

Typical drain-source on-resistance curve

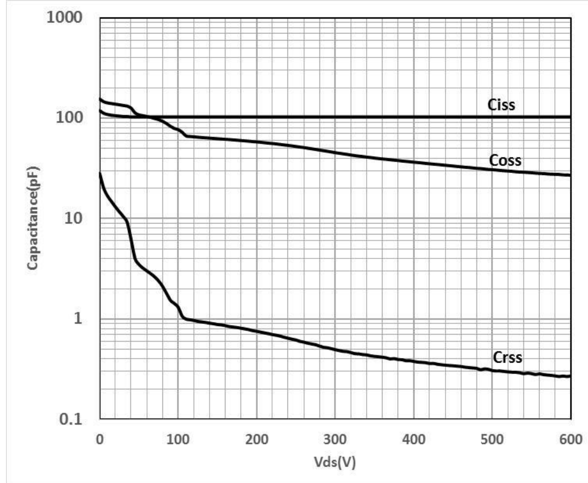


$R_{DS(on)}=f(I_D,V_{GS})$; $T_j=25°C$



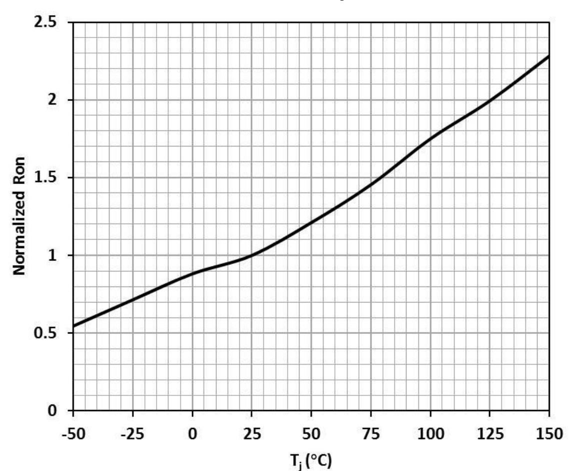
$R_{DS(on)}=f(I_D,V_{GS})$; $T_j=125°C$

Typical capacitance - VDS curve



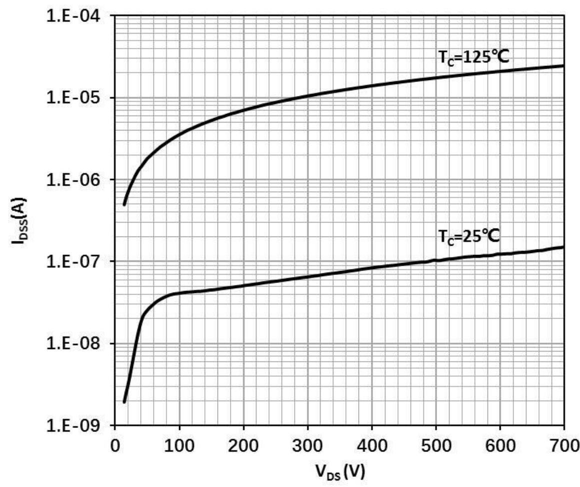
$C_{XSS}=f(V_{DS})$; Freq.=100 kHz

Drain-source on-resistance - Tj curve



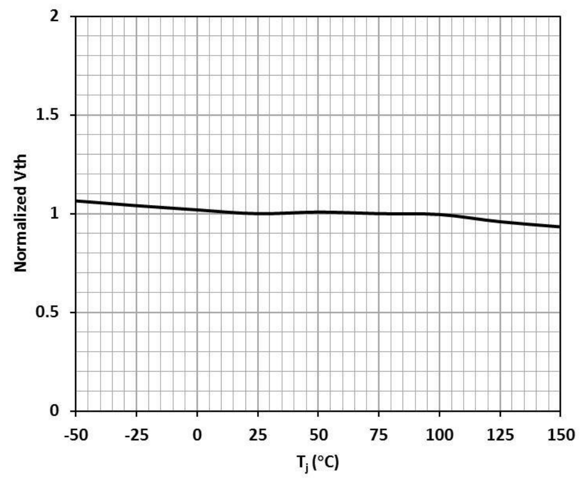
$R_{DS(on)}=f(T_j)$; I_D=5A; V_{GS}=6V, Duty=0.001%

Drain-source leakage current - VDS curve



$I_{DSS}=f(V_{DS})$; $V_{GS}=0V$

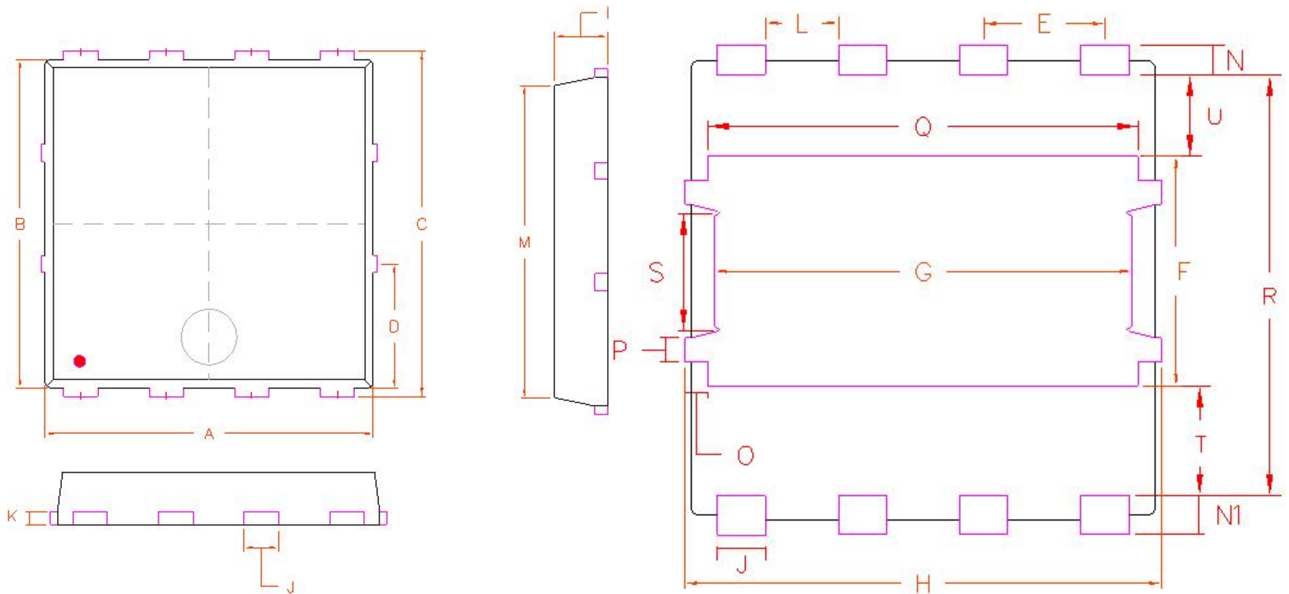
Gate threshold voltage - Tj curve



$V_{TH}=f(T_j)$; $V_{GS}=V_{DS}$; $I_D=14.3mA$

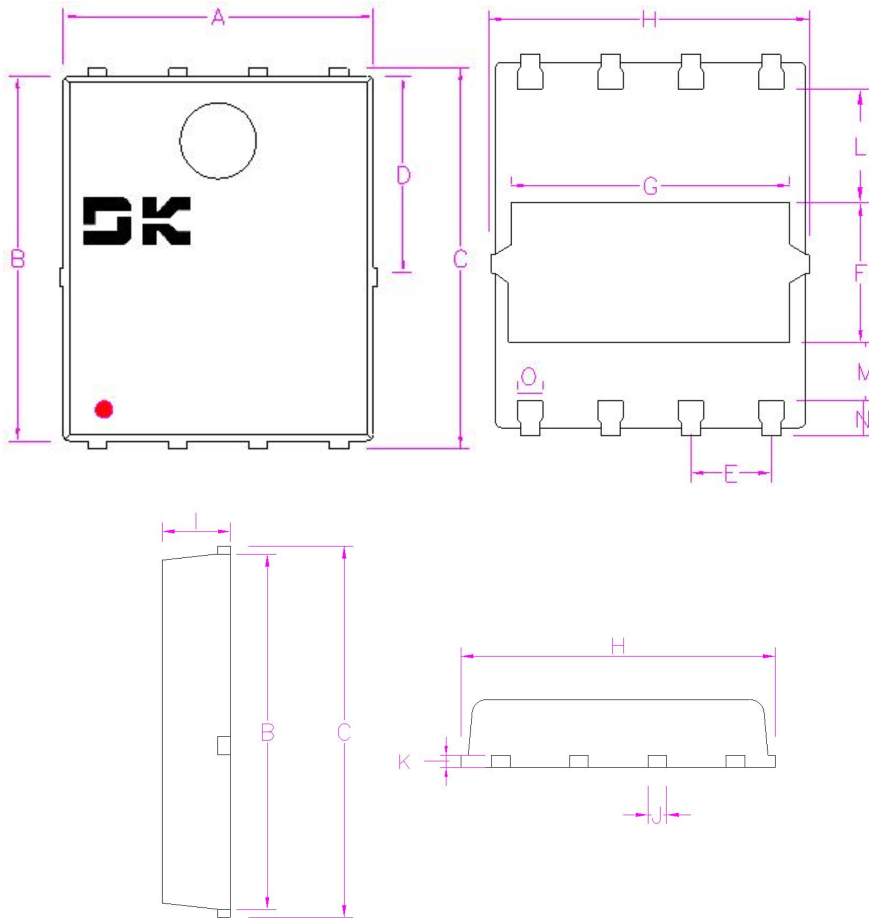
■ PACKAGE OUTLINE DIMENSIONS

PDFN8*8



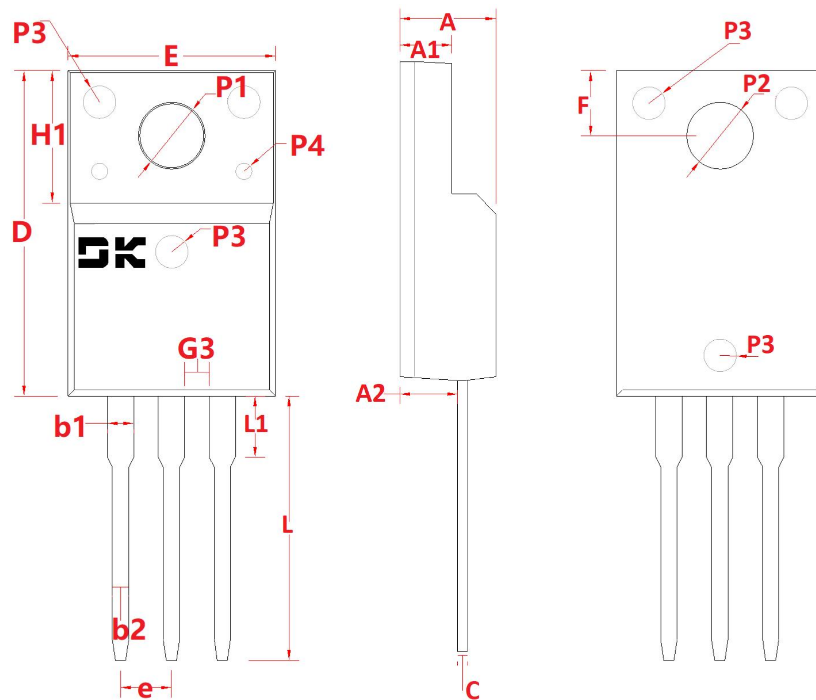
Symbol	Dimensions In Millimeters		
	Min	NOM	Max
A	7.60	7.68	7.78
B	7.60	7.68	7.78
C	8.00	8.08	8.18
D	2.90(NOM)		
E	2.00 BSC		
F	3.80(NOM)		
G	6.90(NOM)		
H	7.75	7.85	7.95
I	1.20	1.23	1.30
J	0.80(NOM)		
K	0.30(NOM)		
L	1.15	1.20	1.25
M	7.30(NOM)		
N	0.40	0.50	0.70
N1	0.50	0.65	0.80
O	0.30	0.40	0.50
P	0.30	0.40	0.50
Q	6.90	7.00	7.10
R	6.80	6.88	7.00
S	2.00	2.10	2.20
T	1.80	1.88	2.00
U	1.10	1.20	1.40

PDFN5*6



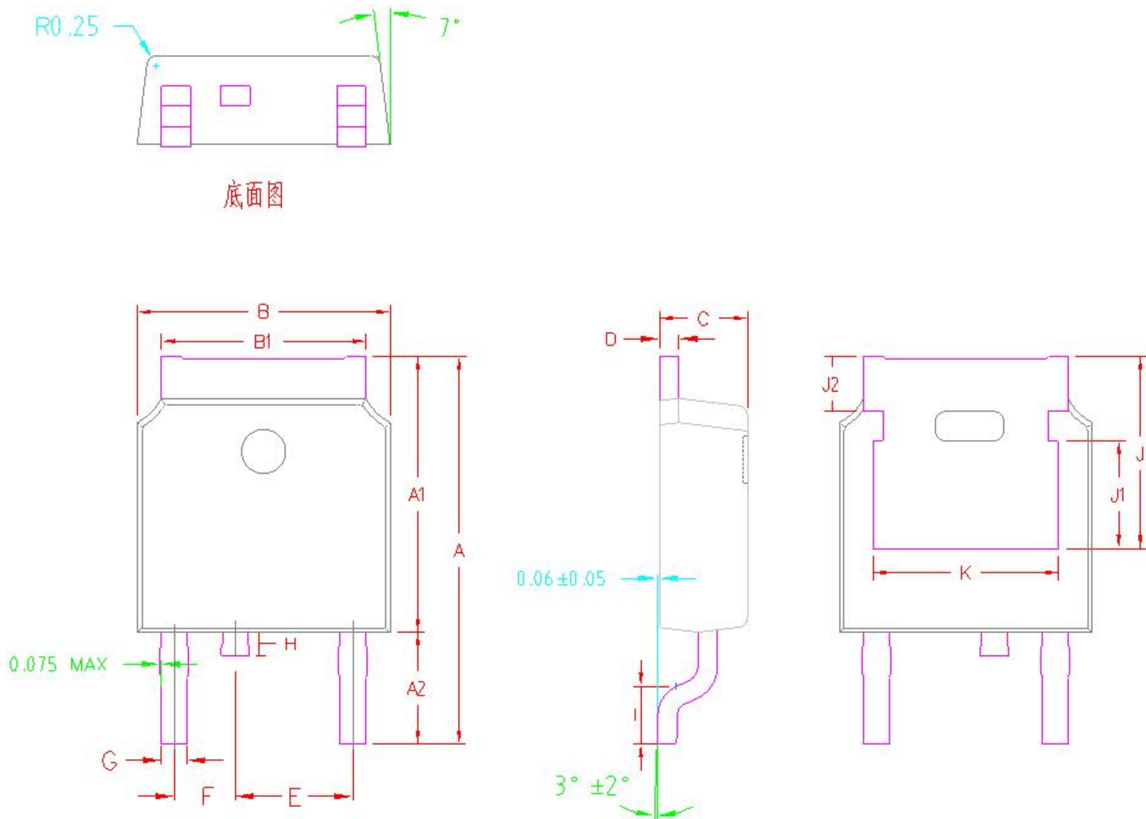
Symbol	Dimensions In Millimeters		
	Min	NOM	Max
A	4.85	4.90	4.95
B	5.70	5.75	5.80
C	6.00	6.02	6.10
D	3.00	3.10	3.20
E	1.27 BSC		
F	2.10	2.20	2.30
G	3.90	4.00	4.10
H	4.98	5.02	5.05
I	1.20	1.23	1.30
J	0.25	0.30	0.35
K	0.24	0.25	0.30
L	1.70	1.80	1.90
M	0.82	0.92	1.02
N	0.45	0.55	0.70
O	0.35	0.40	0.45

TO-220F



Symbol	mm		
	min	nom	max
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	2.50	2.65	2.80
C	0.40	0.50	0.60
E	9.95	10.15	10.35
H1	6.80REF		
D	15.60	15.90	16.20
G3	1.12	1.27	1.42
b1	1.15	1.25	1.35
b2	0.70	0.80	0.90
e	2.54BSC		
L	12.70	13.00	13.30
L1	2.75	2.85	3.05
P1	3.20	3.40	3.60
P2	2.90	3.10	3.30
P3	Diameter 1.5mm, depth of pogo pin hole 0.2mm		
P4	Diameter 0.8mm, depth of pogo pin hole 0.5mm		
F	3.15	3.30	3.45

TO252-4R



Symbol	mm		
	min	nom	max
A	9.90	10.10	10.30
A1	7.10	7.20	7.30
A2	2.80	2.90	3.10
B	6.50	6.60	6.70
B1	5.25	5.35	5.45
C	2.20	2.30	2.40
D	0.45	0.50	0.55
E	3.07(BSC)		
F	1.592(BSC)		
G	0.62	0.67	0.72
H	0.55	0.60	0.70
I	1.40	1.50	1.70
J	5.0(BSC)		
J1	2.70	2.80	2.90
J2	1.30	1.40	1.50
K	4.85(BSC)		