N-Ch Super Junction MOSFET

KP580N65DM3

This Super Jucntion MOSFET has better characteristics, such as fast switching time, low on resistance, low gate charge, low EMI characteristics and excellent avalanche characteristics. It is mainly suitable for power factor correction and switching mode power supplies.

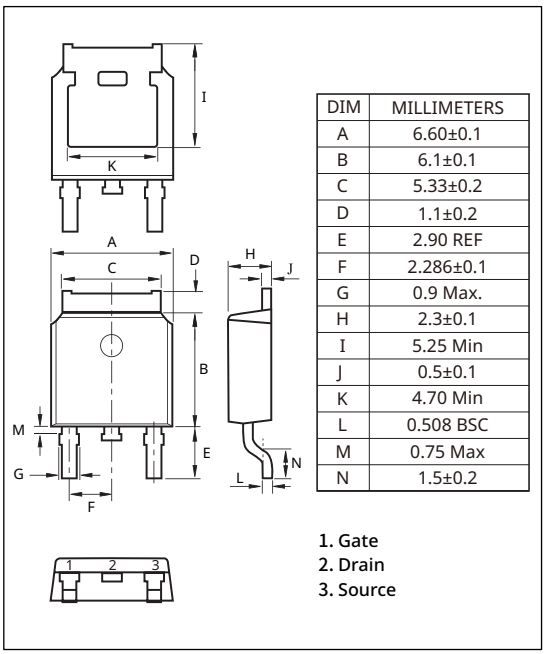
FEATURES

- V_{DSS}=650V, I_D=8A
- Drain-Source ON Resistance:
  $R_{DS(ON)}$(MAX)=580mΩ @ V_{GS}=10V
- Q_g(typ.)=12nC @ V_{GS}=10V

APPLICATION

- PFC Stages
- resonant switching stages
- Fly Back converters
- Power of PC, TV, Lighting, Adapter, Server and Telecom

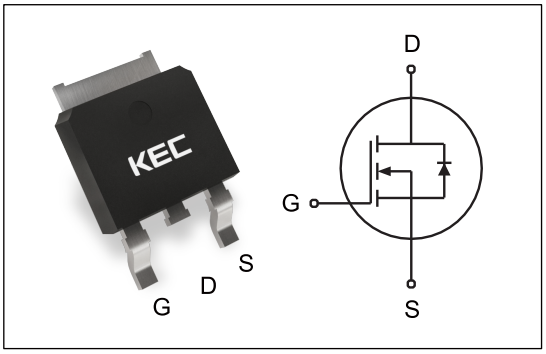
PACKAGE DIMENSION(DPAK(3))



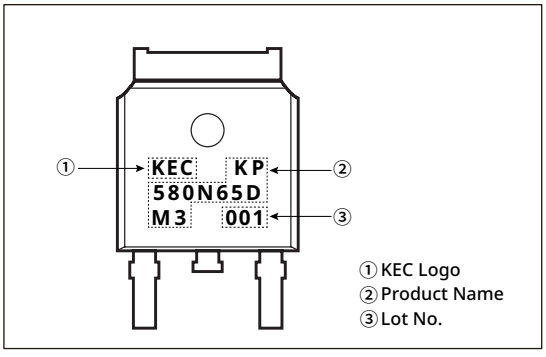
DIM	MILLIMETERS
A	6.60±0.1
B	6.1±0.1
C	5.33±0.2
D	1.1±0.2
E	2.90 REF
F	2.286±0.1
G	0.9 Max.
H	2.3±0.1
I	5.25 Min
J	0.5±0.1
K	4.70 Min
L	0.508 BSC
M	0.75 Max
N	1.5±0.2

1. Gate
2. Drain
3. Source

PIN CONFIGURATION



MARKING CODE



① KEC Logo
② Product Name
③ Lot No.

MAXIMUM RATING (T_J=25℃)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V_{DSS}	650	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	@T_C=25℃	I_D	8*	A
	@T_C=100℃		5*	
	Pulsed (Note 1)	I_{DP}	22	
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	170	mJ
Repetitive Avalanche Energy (Note 1)		E_{AR}	4.3	mJ
Peak MOSFET dv/dt		dv/dt	50	V/ns
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Drain Power Dissipation	T_C=25℃	P_D	83.3	W
	T_A=25℃		2	W
Maximum Junction Temperature		T_J	150	℃
Operation and Storage Temperature Range		T_{opr}, T_{stg}	-55 ~ 150	℃
Thermal Characteristics				
Thermal Resistance, Junction-to-Case		R_{thJC}	1.5	℃/W
Thermal Resistance, Junction-to-Ambient		R_{thJA}	110	℃/W

* : Drain current limited by maximum junction temperature

ELECTRICAL CHARACTERISTICS (T_J=25℃)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	650	-	-	V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=1mA, Referenced to 25℃	-	0.7	-	V/℃
Drain Cut-off Current	I_{DSS}	V_{DS}=650V, V_{GS}=0V	-	-	10	μA
Gate Threshold Voltage	V_{th}	V_{DS}=V_{GS}, I_D=250μA	2	3	4	V
Gate Leakage Current	I_{GSS}	V_{GS}=±30V, V_{DS}=0V	-	-	±100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=4A	-	510	580	mΩ
Dynamic						
Total Gate Charge	Q_g	V_{DD}=400V, I_D=4A, V_{GS}=10V (Note 4)	-	12	-	nC
Gate-Source Charge	Q_{gs}		-	2.6	-	
Gate-Drain Charge	Q_{gd}		-	5	-	
Turn-on Delay time	$t_{d(on)}$	V_{DD}=400V, I_D=4A, V_{GS}=10V, R_G=25Ω (Note 4)	-	22	-	ns
Turn-on Rise time	t_r		-	19	-	
Turn-off Delay time	$t_{d(off)}$		-	65	-	
Turn-off Fall time	t_f		-	16	-	
Input Capacitance	C_{iss}	V_{DS}=400V, V_{GS}=0V, f=1.0MHz	-	505	-	pF
Output Capacitance	C_{oss}		-	14	-	
Reverse Transfer Capacitance	C_{rss}	V_{DS}=400V, V_{GS}=0V, f=250kHz	-	0.9	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS}=0V, V_{DS}=0...400V (Note 5)	-	22	-	
Effective output capacitance, time related	$C_{o(tr)}$	V_{GS}=0V, V_{DS}=0...400V (Note 6)	-	110	-	
Gate Resistance	R_G	V_{GS}=0V, f=1.0MHz	-	19	-	Ω
Source-Drain Diode Ratings						
Continuous Source Current	I_S	V_{GS} < V_{th}, T_C=25℃	-	-	8	A
Pulsed Source Current	I_{SP}		-	-	24	
Diode Forward Voltage	V_{SD}	I_S=4A, V_{GS}=0V	-	-	1.4	V
Reverse Recovery Time	t_{rr}	I_S=4A, V_{GS}=0V, V_{DD}=400V, dI_s/dt=100A/μs	-	210	-	ns
Reverse Recovery Charge	Q_{rr}		-	1.8	-	μC

Note 1) Repetivity rating: Pulse width limited by junction temperature.
Note 2) L=80mH, I_D=2A, V_{DD}=50V, R_G=25Ω, Starting T_J=25℃.
Note 3) $I_S \le I_D$, di/dt ≤ 100A/μs, $V_{DD} \le BV_{DSS}$, Starting T_J=25℃.
Note 4) Essentially independent of operating temperature.
Note 5) $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 400V.
Note 6) $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 400V.

Fig 1. I_D - V_{DS}- 1

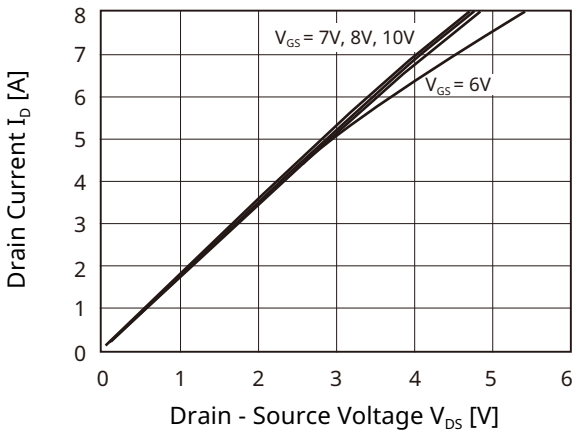
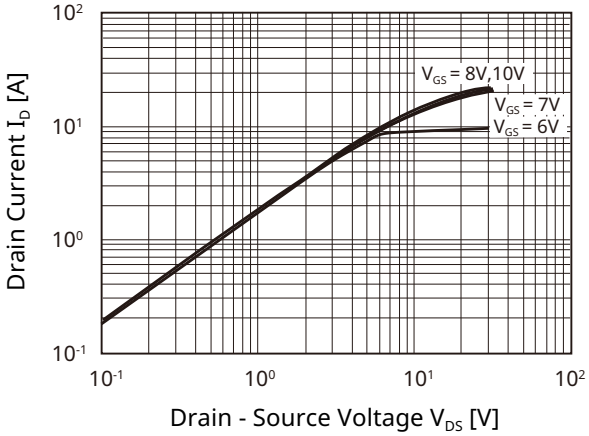


Fig 2. I_D - V_{DS}- 2



V_{DS} = 20V

Fig 3. I_D - V_{GS}

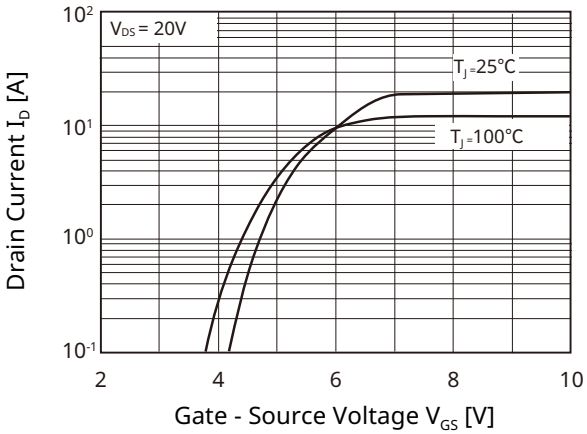


Fig 4. $R_{DS(ON)}$ - I_D

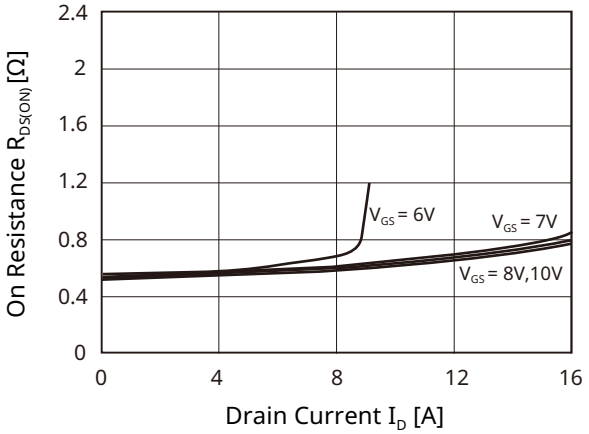


Fig 5. $R_{DS(ON)}$ - V_{GS}

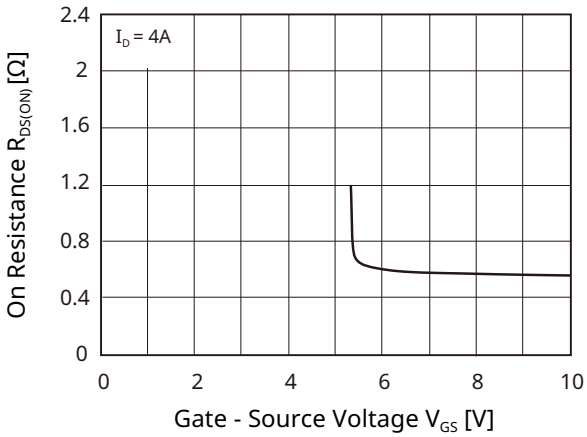


Fig 6. $R_{DS(ON)}$ - T_J

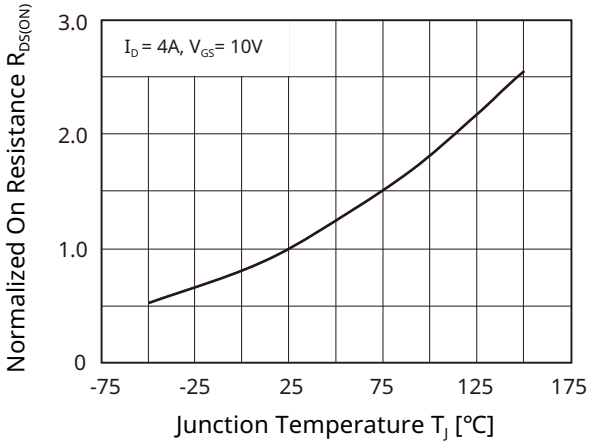


Fig 7. BV_{DSS} - T_J

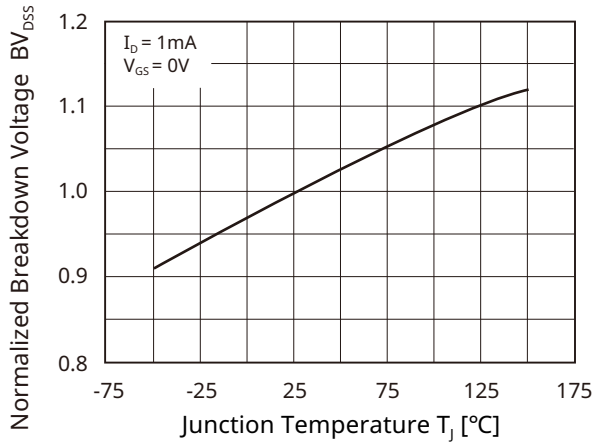


Fig 8. V_{th} - T_J

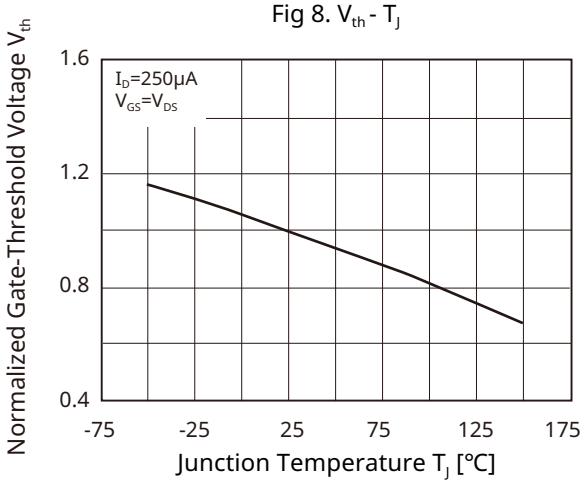


Fig 9. I_S -V_{SD}

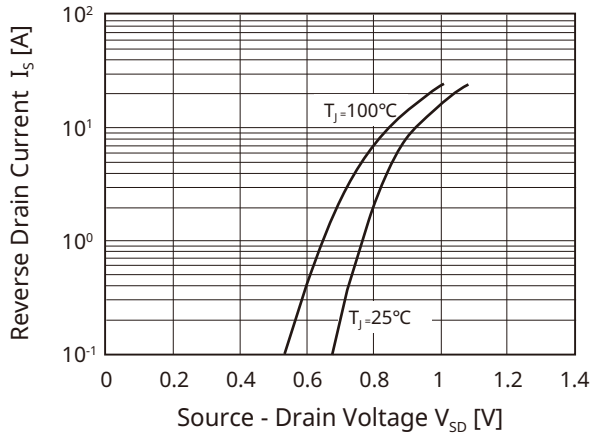


Fig 10. Capacitance V_{DS}

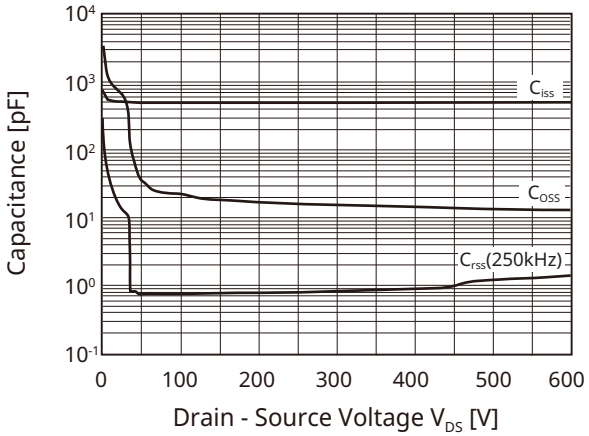


Fig 11. E_{OSS} -V_{DS}

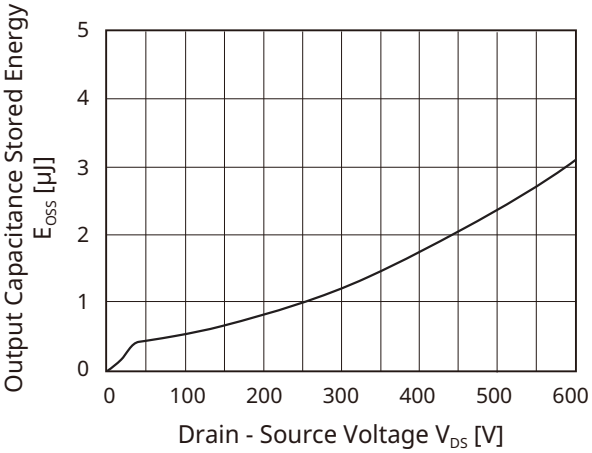


Fig 12. Q_g -V_{GS}

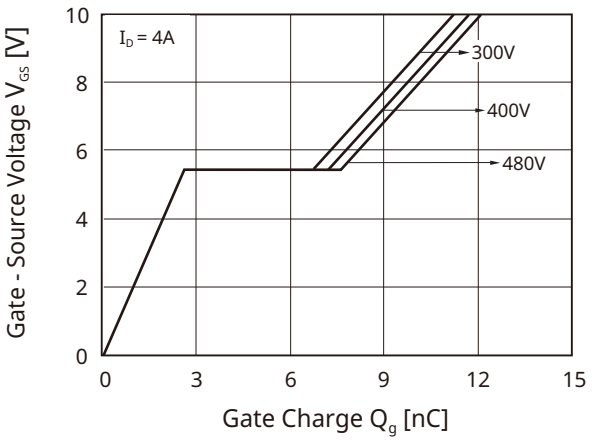


Fig 13. Ptot - T_C

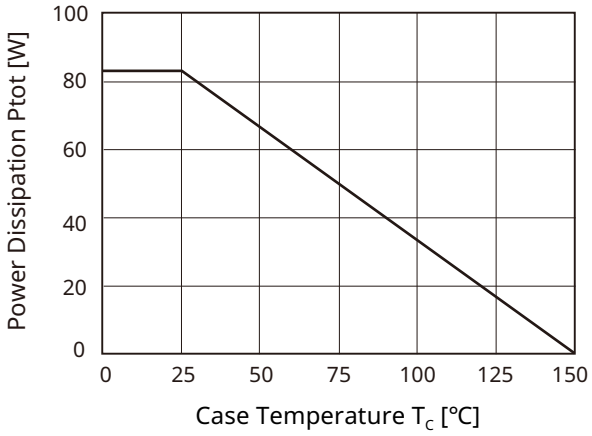


Fig 14. Switching Time - I_D

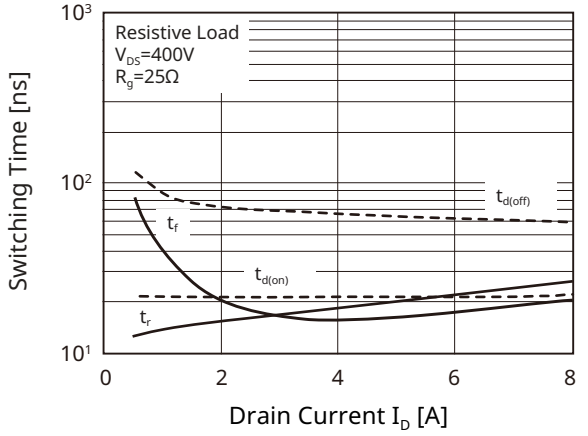


Fig 15. Switching Loss - I_D

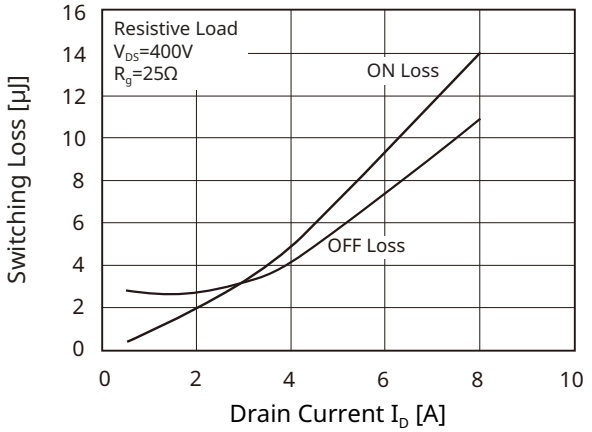


Fig 16. Switching Time - R_g

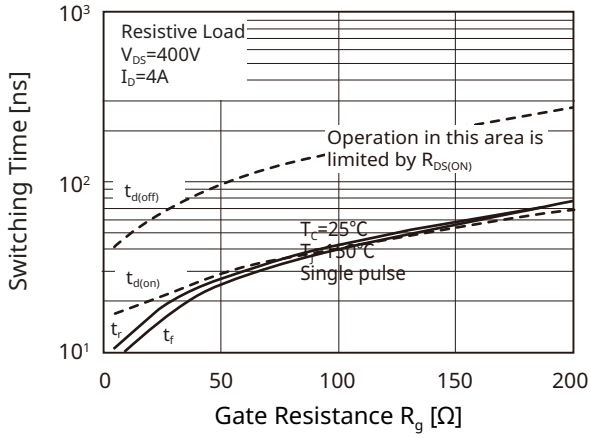


Fig 17. Switching Loss - R_g

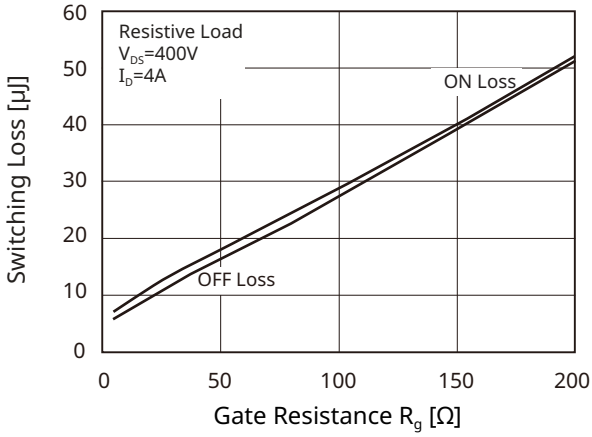


Fig 18. Safe Operation Area

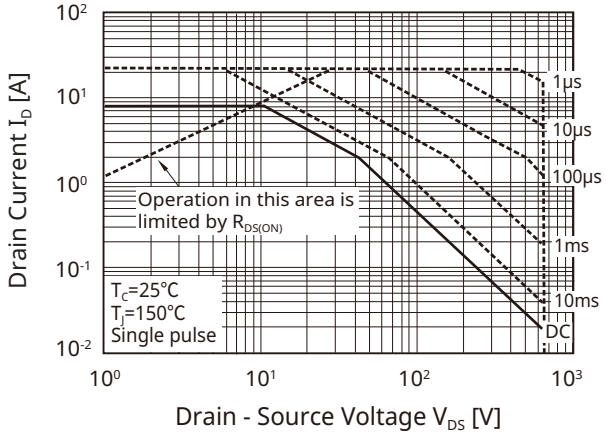


Fig 19. Transient Rth Curve (J-C)

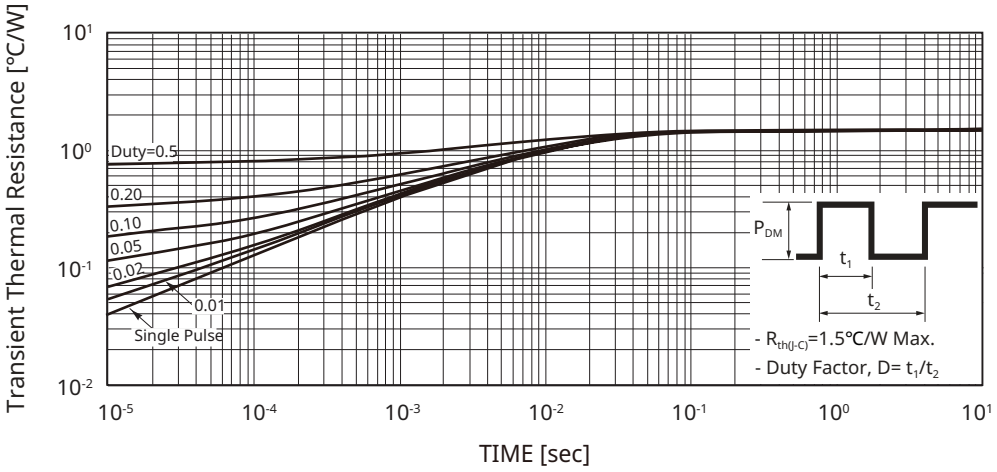


Fig 20. Gate Charge

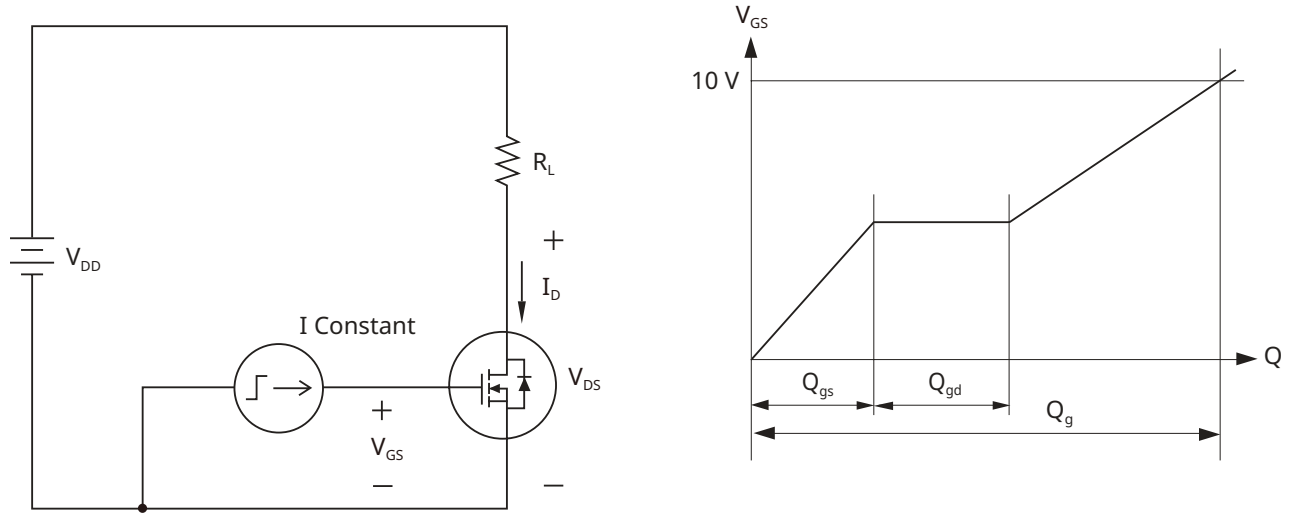


Fig 21. Single Pulsed Avalanche Energy

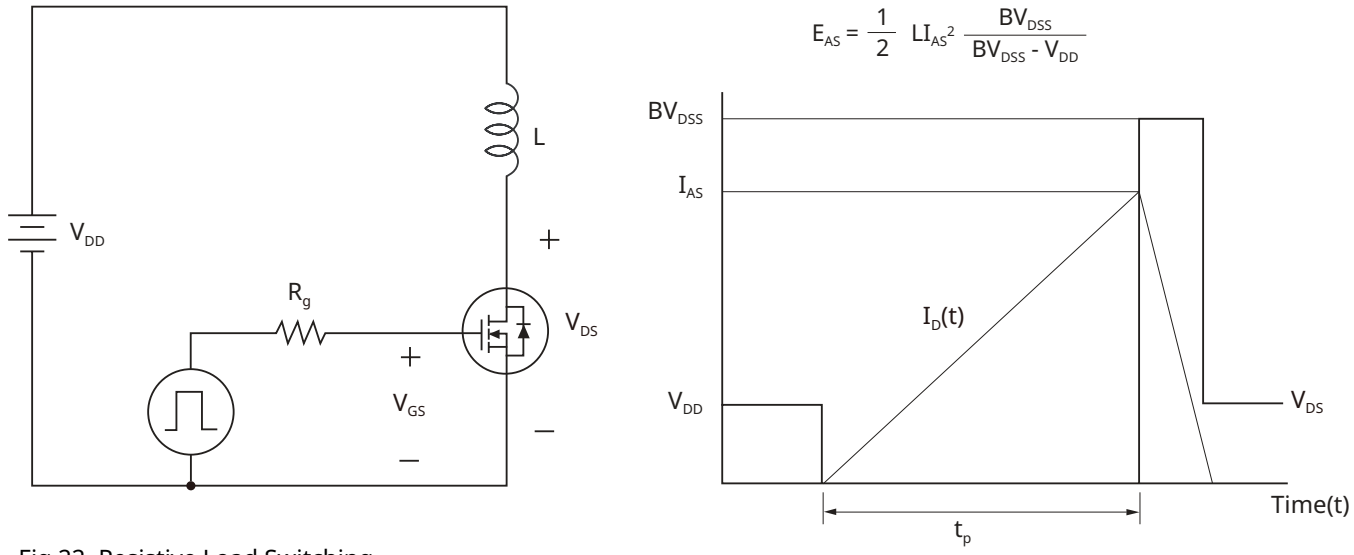


Fig 22. Resistive Load Switching

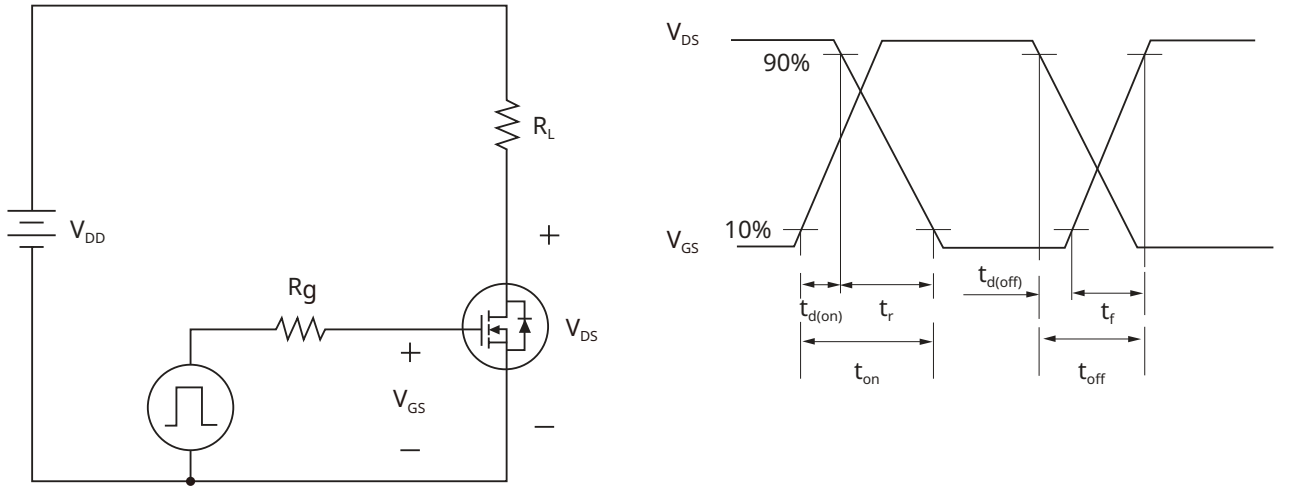
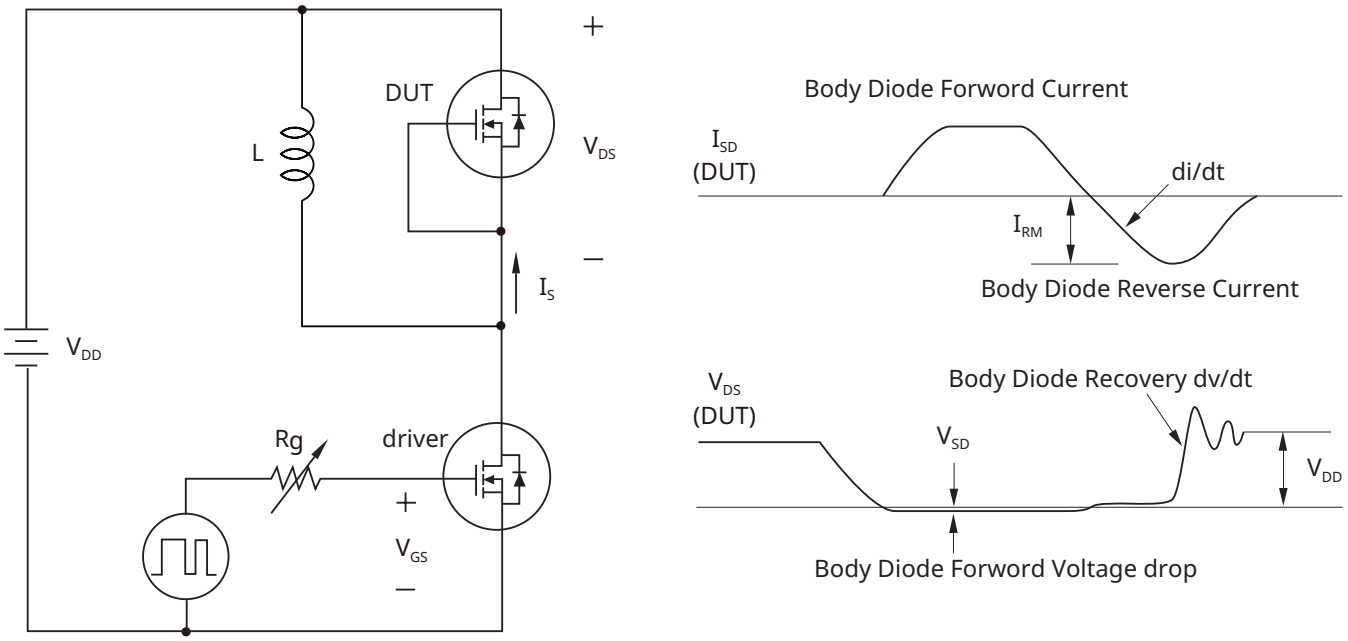
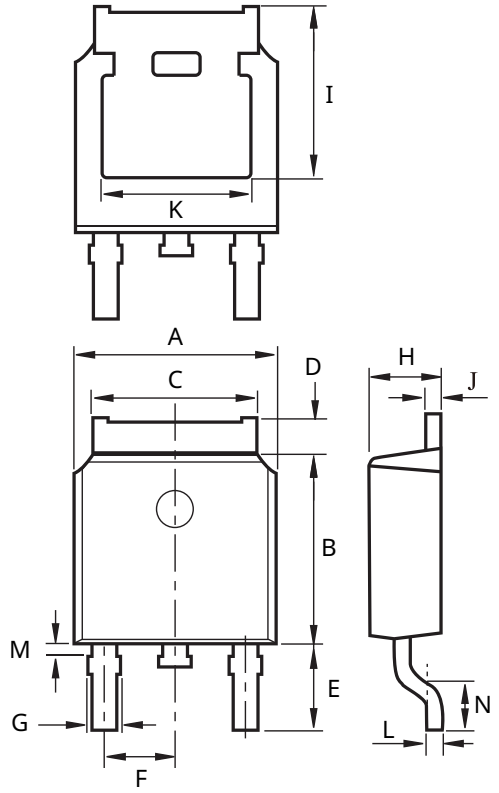


Fig 23. Source - Drain Diode Reverse Recovery and dv /dt



PACKAGE DIMENSION(DPAK(3))



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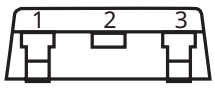
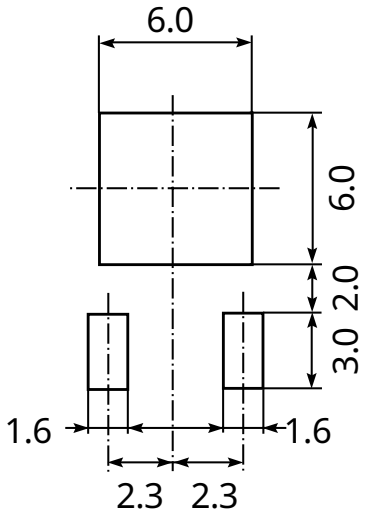


1. Gate
2. Drain
3. Source

RECOMMENDED PAD DIMENSION

UNIT: mm



ORDERING INFORMATION

Part Number	Status	Compliance		Packing Type	Reel Size	Quantity
		AEC-Q	Halogen Free			
KP580N65DM3-RTF/HQ	Active	-	-	Reel	7″	3000
KP580N65DM3-RTH/HQ	Active	-	-	Reel	7″	3000

PRECAUTION ON USING KEC PRODUCTS

1. The products described in this data are intended to be used in general-purpose electronic equipment.
(Office equipment, telecommunication equipment, measuring equipment, home appliances)

2. When you intend to use these products with equipment or device which require an extremely high of reliability and special applications (such as automobile, air travel aerospace, transportation equipment, life support, system and safety devices) in which special quality and reliability and the failure or malfunction of products may directly jeopardize or harm the human body or damage to property and any application other than the standard application intended, please be sure to consult with our sales representative in advance.

3. On designing your application, please use product within the ranges guaranteed by KEC for maximum rating, operating supply voltage range, heat radiation characteristics and other characteristics. User shall be responsible for failure or damage when used beyond the guaranteed ranges.

4. The technical information described in this data is limited to showing representative characteristics and applied circuit examples of the products and it does not constitute the warranting of industrial property, the granting of relative rights, or the granting of any license.

5. What are described in the data may be changed without any prior notice to reflect new technical development. Please confirm that you have received the latest product standards or specification before final design, purchase or use.

6. Although KEC is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors. Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. KEC shall have no responsibility for any damages arising out of the use of our Products beyond the rating specified by KEC.

For additional information,
please contact your local Sales Representative.

SOUTH KOREA (Headquarters)
KEC CORPORATION
PHONE : +82-2-2025-5000
sales@kec.co.kr

JAPAN
KEC JAPAN CO.,LTD.
PHONE : +81-03-5475-2691
kec_jp@kec.co.kr

SINGAPORE
KEC SINGAPORE PTE., LTD.
PHONE : +65-6748-7372(#102)
kec_sg@kec.co.kr

THAILAND
KEC THAILAND BANGKOK OFFICE
PHONE : +66-2-576-1484~5
kec_th@kec.co.kr

CHINA
KEC SHANGHAI CO.,LTD.
PHONE : +86-21-5490-2277
kec_sh@kec.co.kr

KEC SHENZHEN OFFICE
PHONE : +86-755-8830-8899
kec_hk@kec.co.kr

KEC TIANJIN OFFICE
PHONE : +86-21-5490-2277
kec_sh@kec.co.kr

HONG KONG
KEC HK CORP. LTD
PHONE : +852-2249-3734
kec_hk@kec.co.kr

TAIWAN
KEC TAIWAN CO.,LTD.
PHONE : +886-2-2515-8359
kec_twn@kec.co.kr

U.S.A
KEC AMERICA CORP.
PHONE : +1-714-259-0662
kec_a@kec.co.kr

KECCORP.COM
KEC.CO.KR