

N-Ch Super Junction MOSFET

KP099N60FM3

This Super Junction 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.

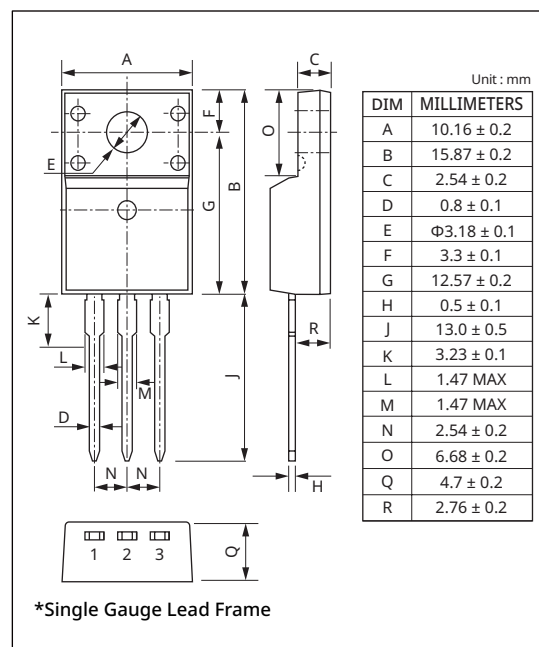
FEATURES

- $V_{DS} = 600V$, $I_D = 38A$
- Drain-Source ON Resistance:
 $R_{DS(ON)}(Max) = 99m\Omega @ V_{GS} = 10V$
- $Q_g(typ.) = 47nC @ V_{GS} = 10V$

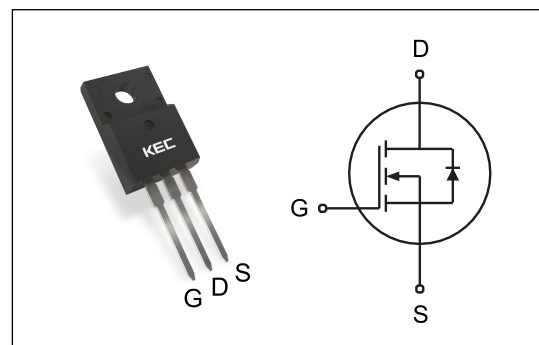
APPLICATION

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

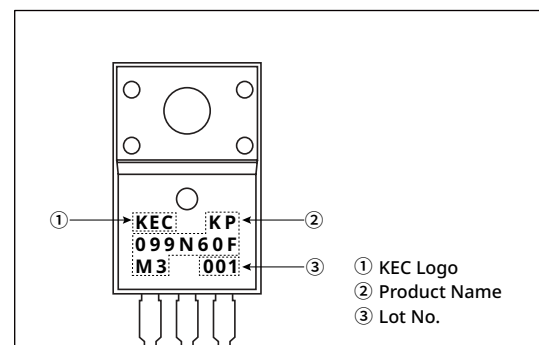
PACKAGE DIMENSION(TO-220IS(1))



PIN CONFIGURATION



MARKING CODE



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MAXIMUM RATING (T_J=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		V _{DSS}	600	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	@T _C =25°C	I _D	38*	A
	@T _C =100°C	I _D	24*	
	Pulsed (Note 1)	I _{DP}	114*	
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	930	mJ
Repetitive Avalanche Energy (Note 1)		E _{AR}	10.2	mJ
Peak MOSFET dv/dt		dv/dt	50	V/ns
Peak Diode Recovery dv/dt (Note 3)		dv/dt	15	V/ns
Drain Power Dissipation	T _C =25°C	P _D	65	W
	T _A =25°C		2	W
Maximum Junction Temperature		T _J	150	°C
Operation and Storage Temperature Range		T _{opr} , T _{stg}	-55 ~ 150	°C
Thermal Characteristics				
Thermal Resistance, Junction-to-Case		R _{thJC}	1.9	°C/W
Thermal Resistance, Junction-to-Ambient		R _{thJA}	62.5	°C/W

* : Drain current limited by maximum junction temperature

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N-Ch Super Junction MOSFET - KP099N60FM3

ELECTRICAL CHARACTERISTICS(T_J=25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	600	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	I _D =1mA, Referenced to 25°C	-	0.7	-	V/°C
Drain Cut-off Current	I _{DSS}	V _{DS} =600V, V _{GS} =0V	-	-	10	μA
Gate Threshold Voltage	V _{th}	V _{DS} =V _{GS} , I _D =1.5mA	3.0	4.0	5.0	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 =19A	-	92	99	mΩ
Dynamic						
Total Gate Charge	Q _g	V _{DD} =400V, I _D =19A, V _{GS} =10V (Note 4)	-	47	-	nC
Gate-Source Charge	Q _{gs}		-	13.0	-	
Gate-Drain Charge	Q _{gd}		-	19.5	-	
Turn-on Delay time	t _{d(on)}	V _{DD} =400V, I _D =19A, V _{GS} =10V, R _G =25Ω (Note 3,4)	-	48.5	-	ns
Turn-on Rise time	t _r		-	53.5	-	
Turn-off Delay time	t _{d(off)}		-	150	-	
Turn-off Fall time	t _f		-	26	-	
Input Capacitance	C _{iss}	V _{DS} =400V, V _{GS} =0V, f=1MHz	-	2040	-	pF
Output Capacitance	C _{oss}		-	64	-	
Reverse Transfer Capacitance	C _{rss}	V _{DS} =400V, V _{GS} =0V, f=250kHz	-	1.5	-	
Effective Output Capacitance, Energy Related	C _{o(er)}	V _{GS} =0V, V _{DS} =0...400V (Note 5)	-	115	-	
Effective Output Capacitance, Time Related	C _{o(tr)}	V _{GS} =0V, V _{DS} =0...400V (Note 6)	-	569	-	
Gate Resistance	R _G	V _{GS} =0V, f=1MHz	-	4.1	-	Ω
Source-Drain Diode Ratings						
Continuous Source Current	I _S	V _{GS} < V _{th} , T _C =25°C	-	-	39	A
Pulsed Source Current	I _{SP}		-	-	114	
Diode Forward Voltage	V _{SD}	I _S =19A, V _{GS} =0V	-	-	1.4	V
Reverse Recovery Time	t _{rr}	I _S =19A, V _{GS} =0V, V _{DD} =400V dI _S /dt=100A/μs	-	377	-	ns
Reverse Recovery Charge	Q _{rr}		-	6.2	-	μC

Note 1) Repetivity rating: Pulse width limited by junction temperature.

Note 2) L=19.4mH, I_D=9.5A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C.

Note 3) I_S ≤ I_D, di/dt ≤ 100A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=25°C.

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.

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Fig1. $I_D - V_{DS} - 1$

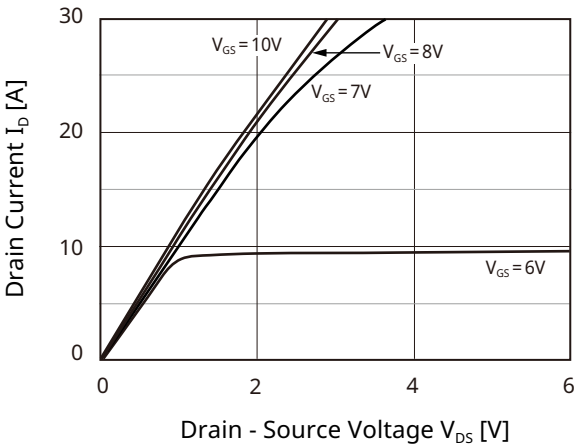


Fig2. $I_D - V_{DS} - 2$

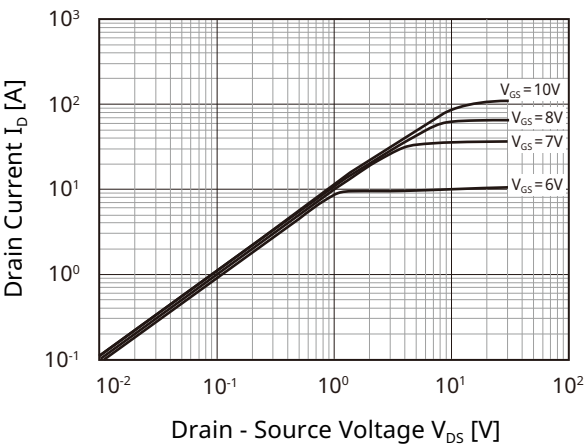


Fig3. $I_D - V_{GS}$

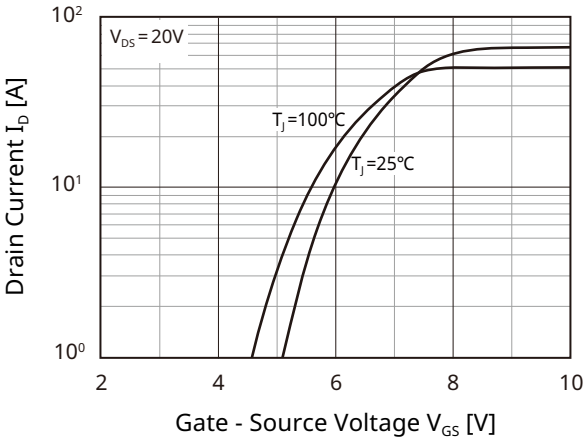


Fig4. $R_{DS(ON)} - I_D$

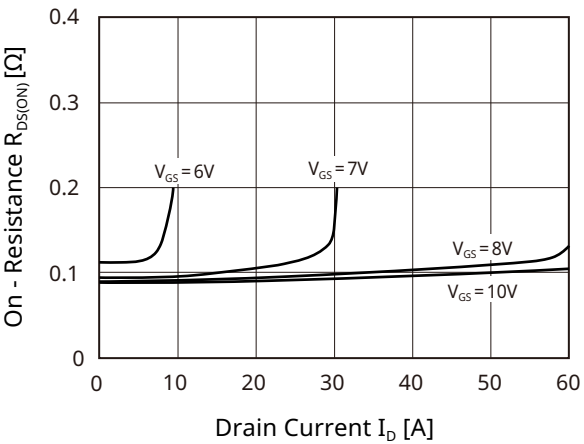


Fig5. $R_{DS(ON)} - V_{GS}$

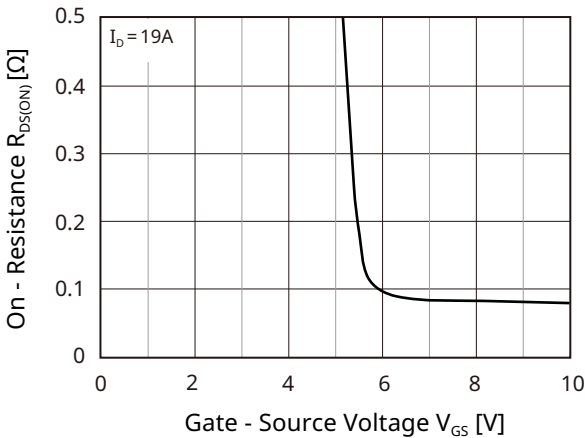
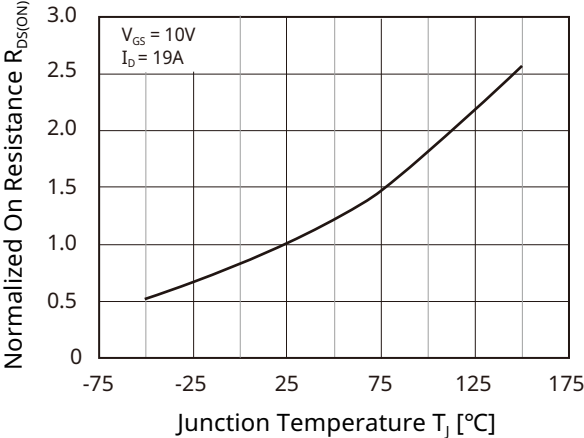


Fig6. $R_{DS(ON)} - T_J$



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Fig7. $BV_{DSS} - T_J$

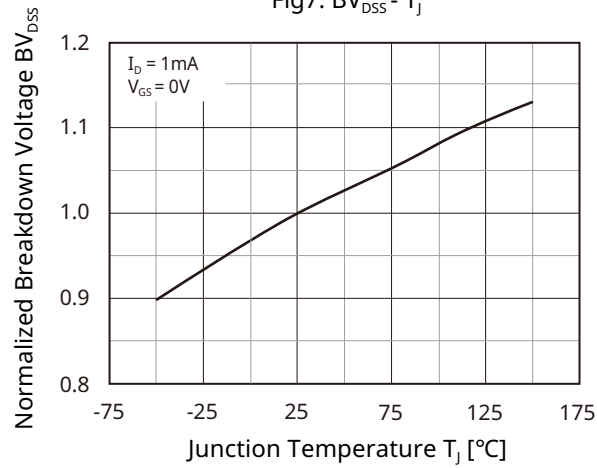


Fig8. $V_{th} - T_J$

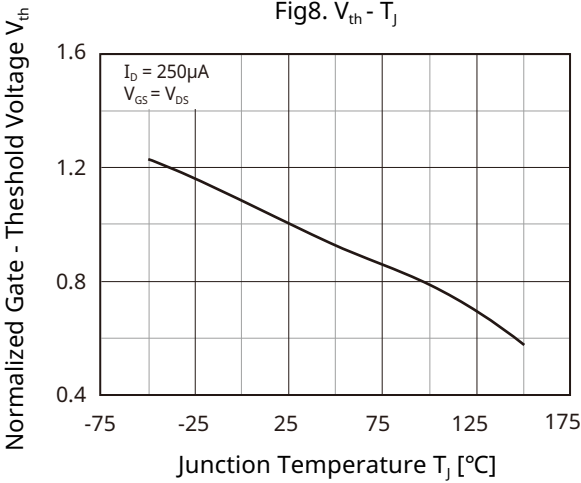


Fig9. $I_S - V_{SD}$

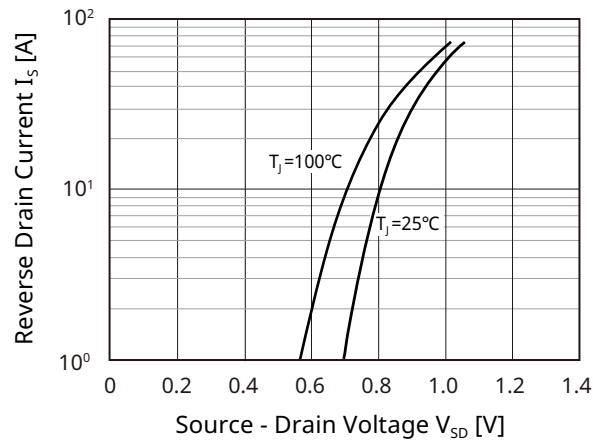


Fig10. Capacitance - V_{DS}

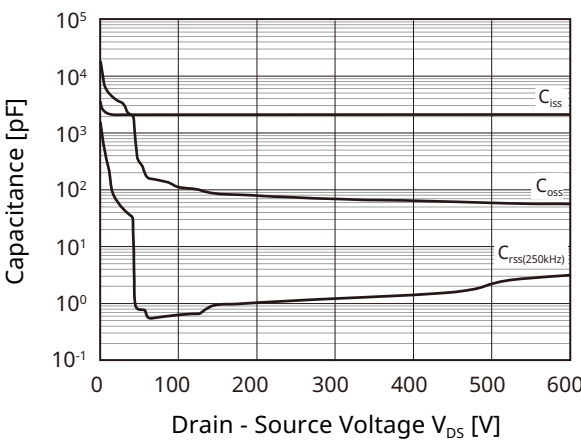


Fig11. $E_{oss} - V_{DS}$

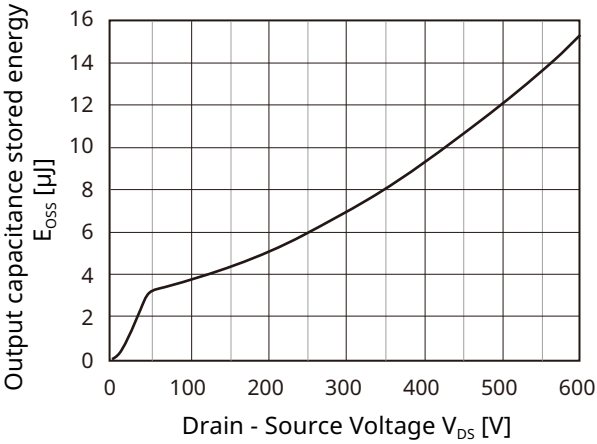
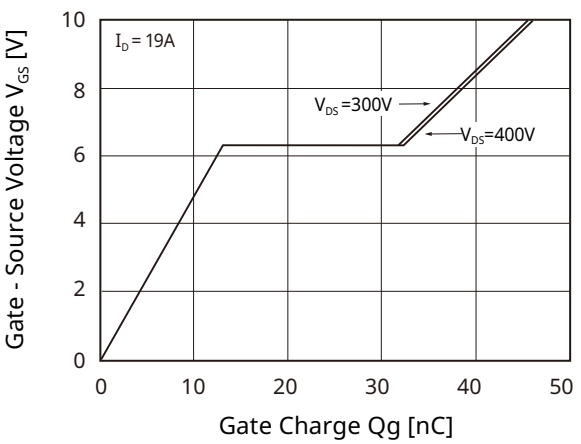


Fig12. $Q_g - V_{GS}$



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Fig13. Ptot - T_C

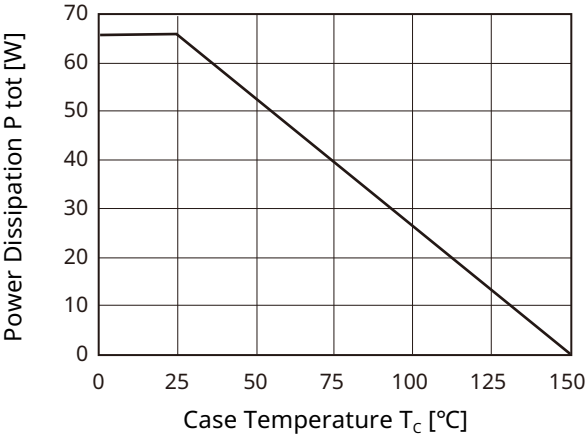


Fig14. Switching Time - I_D

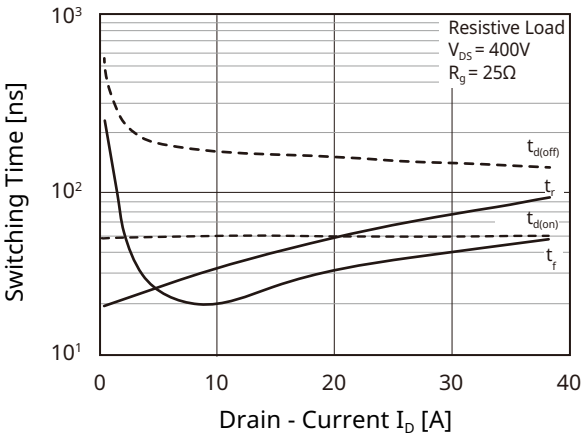


Fig15. Switching Loss - I_D

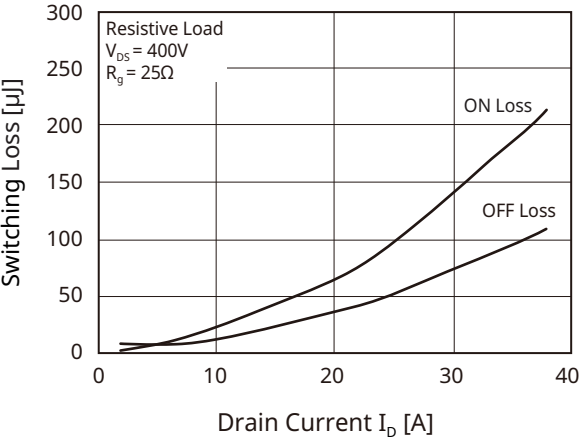


Fig16. Switching Time - R_g

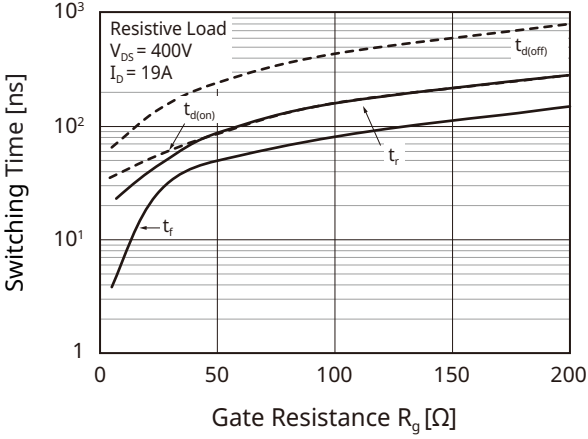


Fig17. Switching Loss - R_g

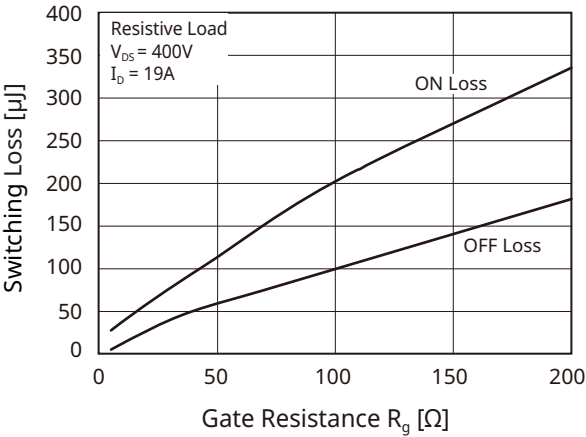
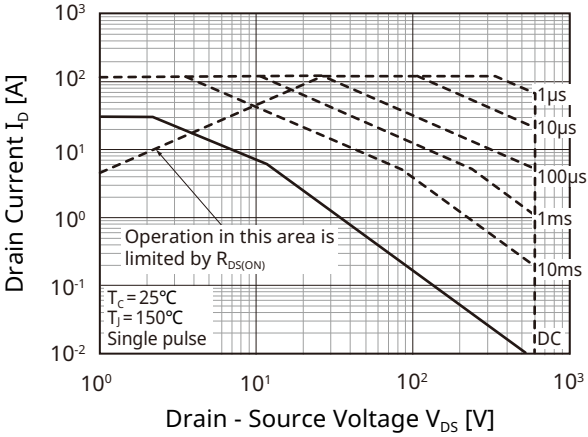
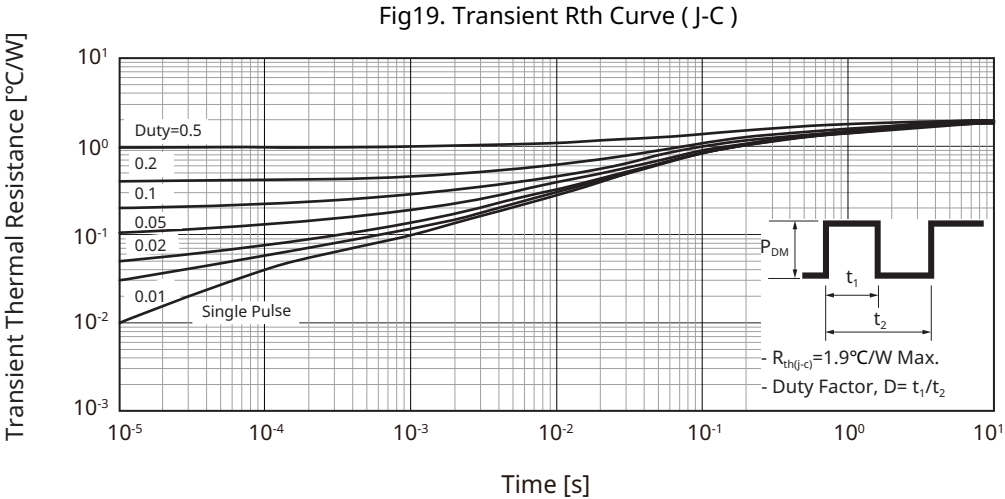


Fig18. Safe Opretation Area



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Fig 20. Gate Charge

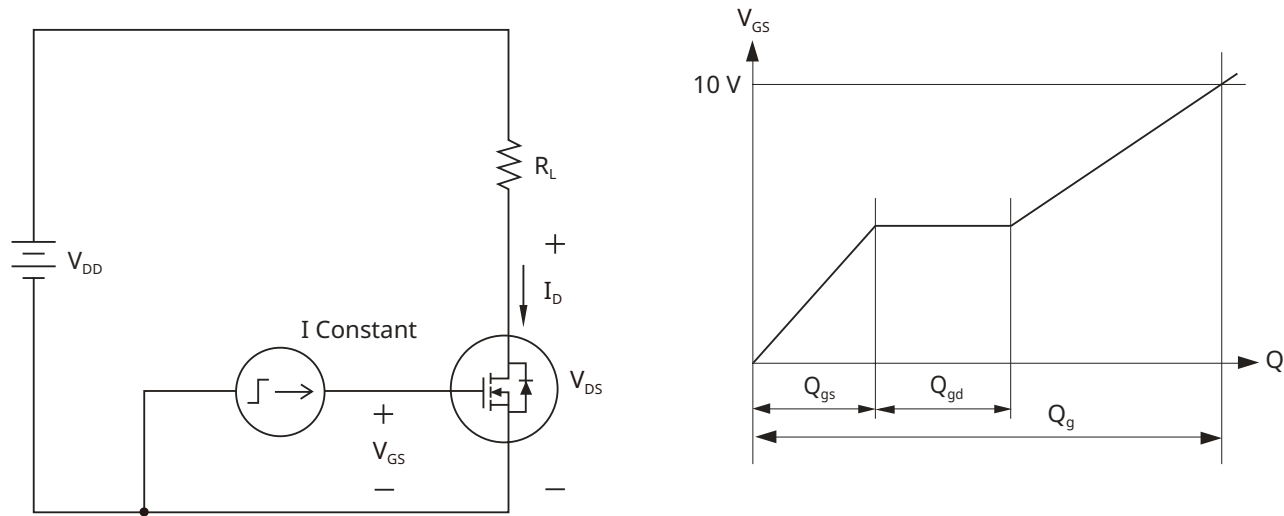


Fig 21. Single Pulsed Avalanche Energy

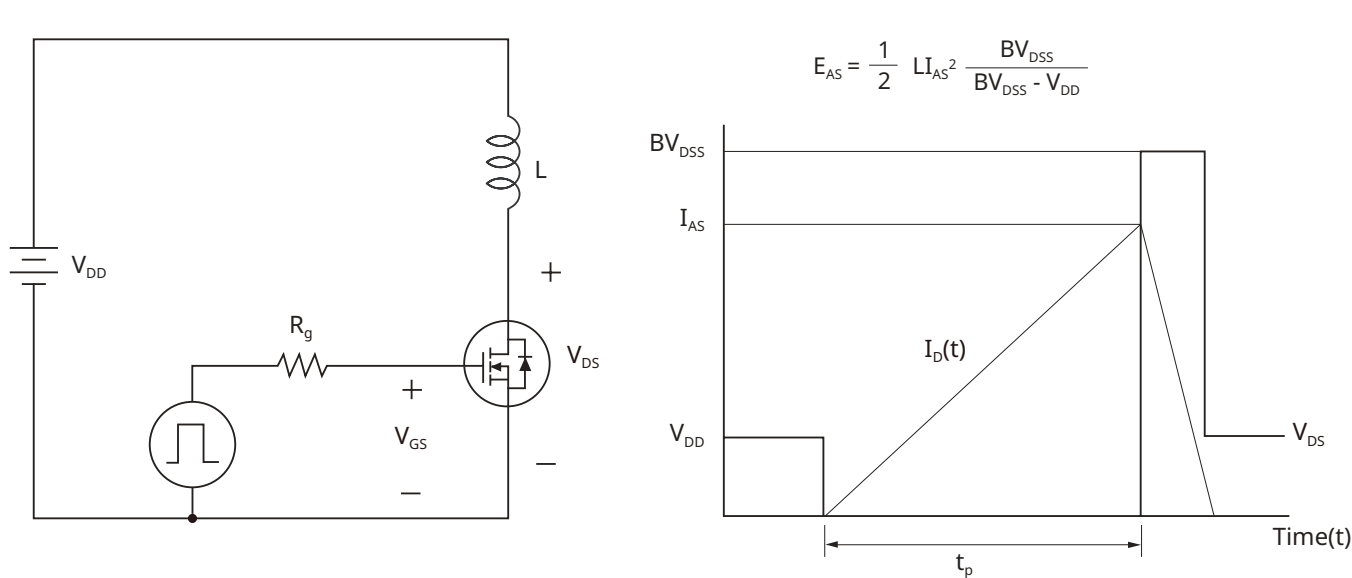
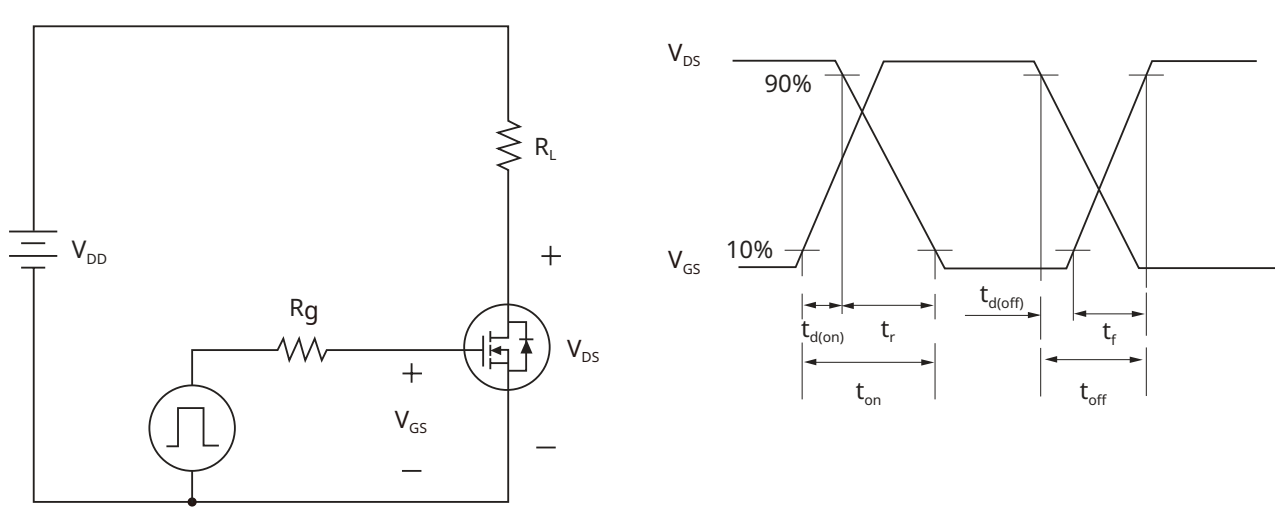


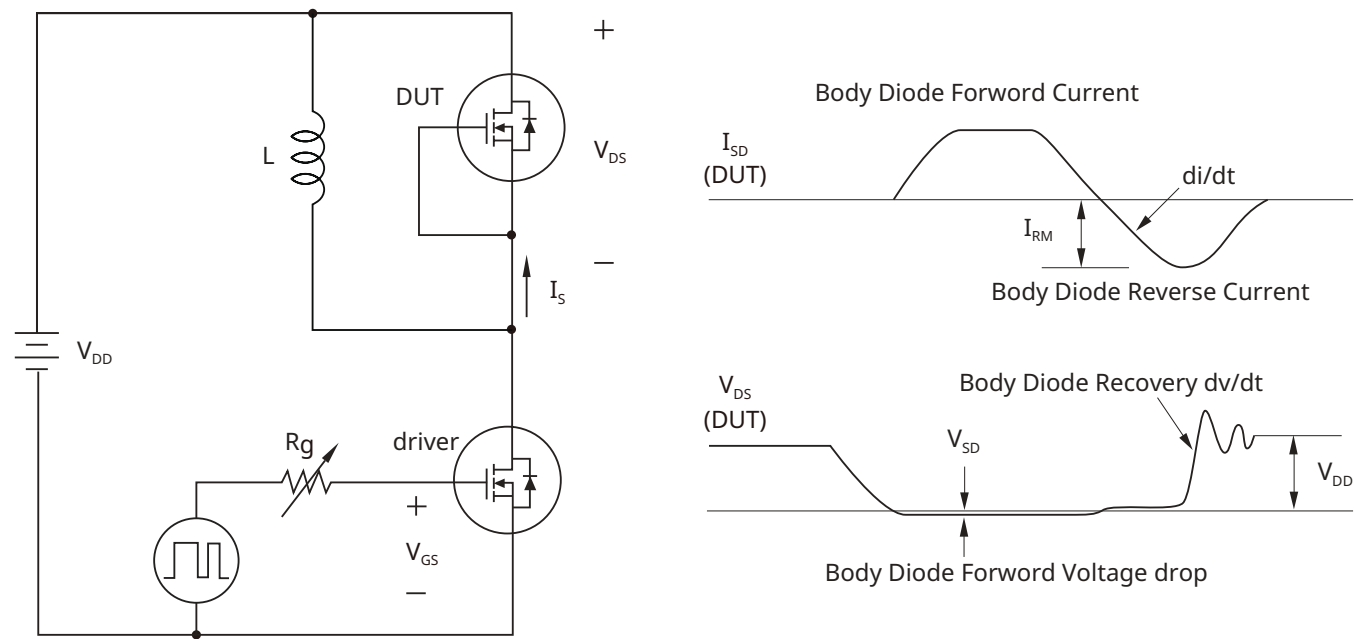
Fig 22. Resistive Load Switching



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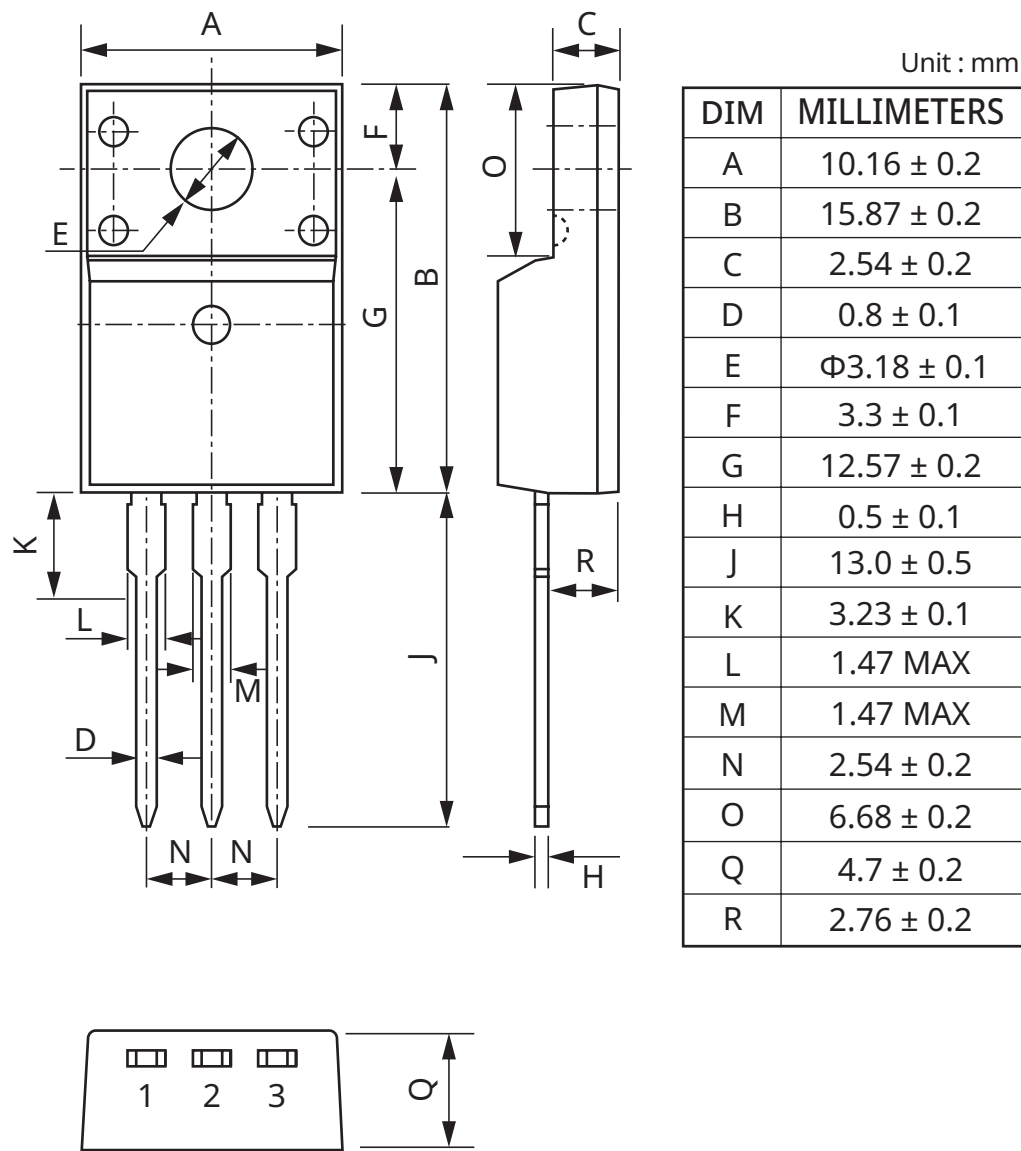
Fig 23. Source - Drain Diode Reverse Recovery and dv /dt



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PACKAGE INFORMATION(TO-220IS(1))



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ORDERING INFORMATION

Part Number	Status	Compliance			Packing Type	Packing Qty
		AEC-Q	Pb-Free	Halogen Free		
KP099N60FM3-U/PF	Active	-	Y	-	Tube	50

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1. The products described in this data are intended to be used in general-purpose electronic equipment.
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