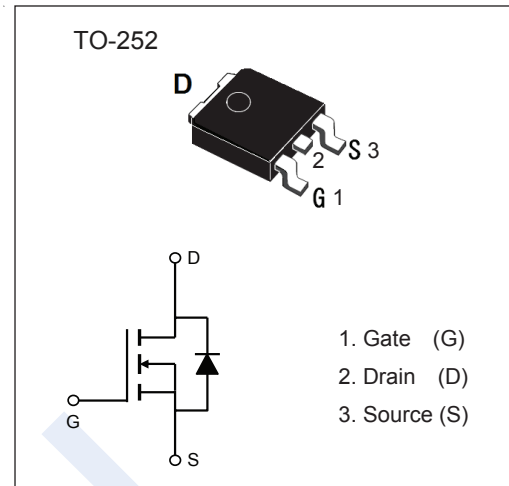


N-Channel MOSFET

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■ Features

- $V_{DS} = 40\text{ V}$
- I_D (at $V_{GS}=10\text{V}$) = 70 A
- $R_{DS(ON)}$ (at $V_{GS} = 10\text{ V}$) < 3.0 m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 4.5\text{ V}$) < 3.8 m Ω
- 100% UIS Tested
- 100% R_g Tested

■ Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	$T_C = 25^\circ\text{C}$	I_D	70	A
	$T_C = 100^\circ\text{C}$		55	
Pulsed Drain Current (Note 2)		I_{DM}	300	
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_{DSM}	23	
	$T_A = 70^\circ\text{C}$		18	
Avalanche Current (Note 2)		I_{AS}	68	A
Avalanche Energy $L = 0.1\text{mH}$ (Note 2)		E_{AS}	231	mJ
Thermal Resistance, Junction- to-Ambient (Note 5)		$R_{\theta JA}$	47	$^\circ\text{C/W}$
Thermal Resistance, Junction- to-Case		$R_{\theta JC}$	1	
Power Dissipation (Note 4)	$T_C = 25^\circ\text{C}$	P_D	150	W
	$T_C = 100^\circ\text{C}$		75	
Power Dissipation (Note 5)	$T_A = 25^\circ\text{C}$	P_{DSM}	2.7	
	$T_A = 70^\circ\text{C}$		1.7	
Junction Temperature		T_J	175	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55 to 175	

Notes:

1. The maximum current rating is package limited.
2. Single pulse width limited by junction temperature $T_{J(MAX)}=175^\circ\text{C}$.
3. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
4. The power dissipation P_D is based on $T_{J(MAX)}=175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
5. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ $t \leq 10\text{s}$ and the maximum allowed junction temperature of 175°C . The value in any given application depends on the user's specific board design.

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■ Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Static Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 250 μA, V _{GS} = 0V	40			V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40 V, V _{GS} = 0 V			1	μA	
		V _{DS} = 40 V, V _{GS} = 0 V, T _J =55°C			5		
Gate to Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA	
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1.0		2.2	V	
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		2.3	3.0	mΩ	
		V _{GS} = 10 V, I _D = 20 A, T _J =125°C		3.6	4.8		
		V _{GS} = 4.5 V, I _D = 20 A		2.8	3.8		
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 20 A		78		S	
Dynamic Characteristics							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 20 V, f = 1 MHz		3510	4300	pF	
Output Capacitance	C _{oss}			1070			
Reverse Transfer Capacitance	C _{rss}			68			
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f = 1MHz	0.5	1	1.5	Ω	
Switching Characteristics							
Total Gate Charge (10V)	Q _g	V _{GS} = 10V, V _{DS} = 20 V, I _D = 20 A		49	60	nC	
Total Gate Charge (4.5V)				22			
Gate Source Charge			Q _{gs}		9		
Gate Drain Charge			Q _{gd}		7		
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 20 V, R _L = 1 Ω, R _{GEN} = 3 Ω		11		ns	
Turn-On Rise Time	t _r			10			
Turn-Off DelayTime	t _{d(off)}			38			
Turn-Off Fall Time	t _f			11			
Drain-Source Diode Characteristics							
Body Diode Reverse Recovery Time	t _{rr}	I _F = 20A, di/dt = 500 A/μs		21		ns	
Body Diode Reverse Recovery Charge	Q _{rr}			58		nC	
Maximum Body-Diode Continuous Current	I _S	(Note 1)			70	A	
Diode Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = 1 A		0.65	1	V	

Notes:

- The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
- These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)} = 175°C. The SOA curve provides a single pulse rating.
- These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A = 25°C.

■ Marking

Marking	K5092 KC***
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N-Channel MOSFET

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■ Typical Electrical And Thermal Characteristics

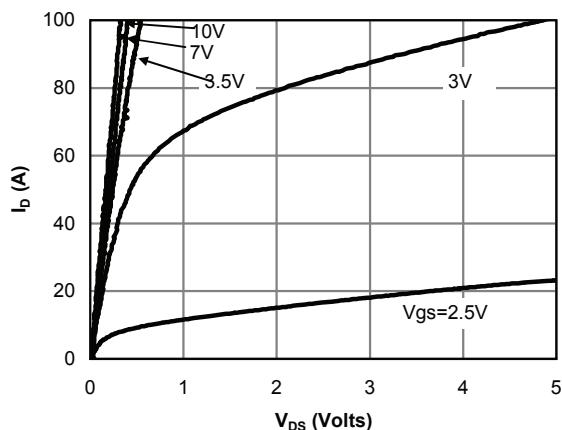


Fig 1: On-Region Characteristics (Note 6)

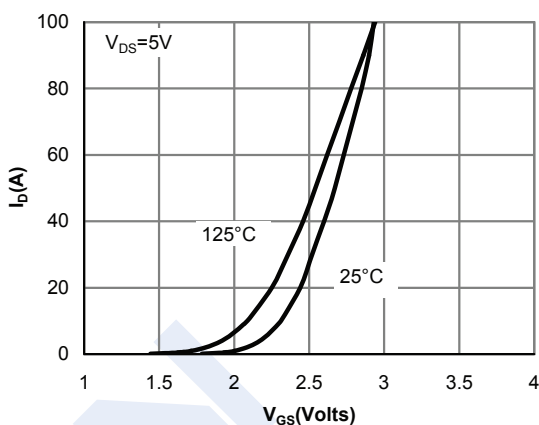


Figure 2: Transfer Characteristics (Note 6)

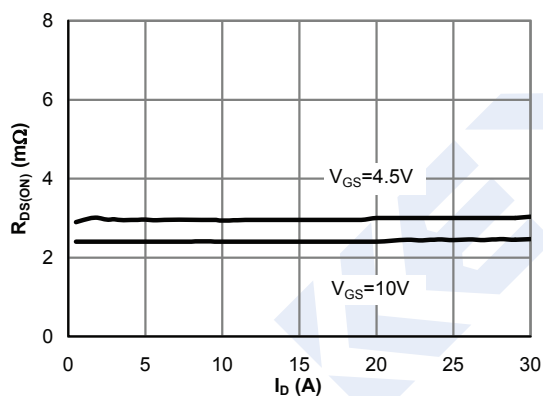


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note 6)

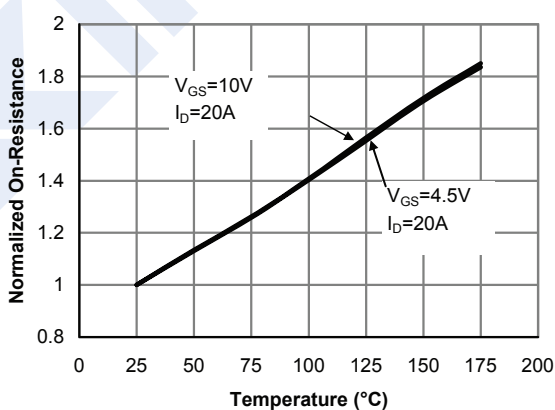


Figure 4: On-Resistance vs. Junction Temperature (Note 6)

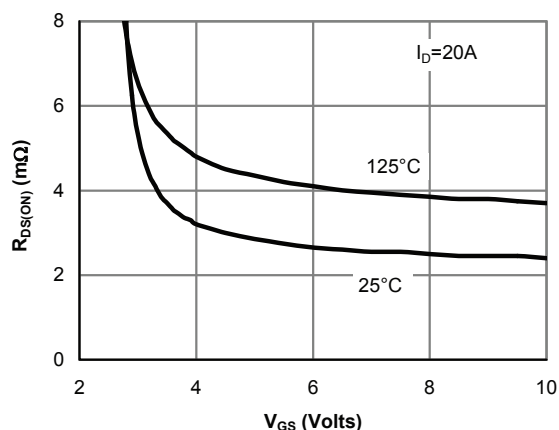


Figure 5: On-Resistance vs. Gate-Source Voltage (Note 6)

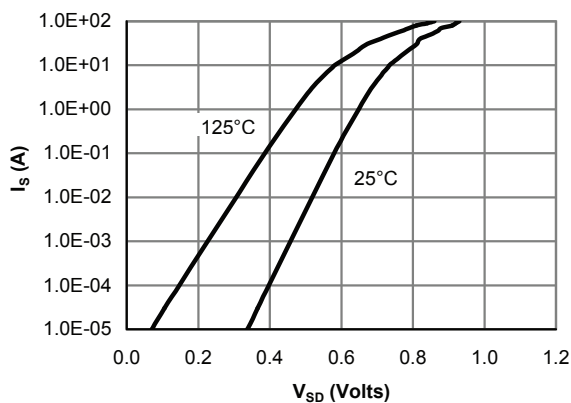


Figure 6: Body-Diode Characteristics (Note 6)

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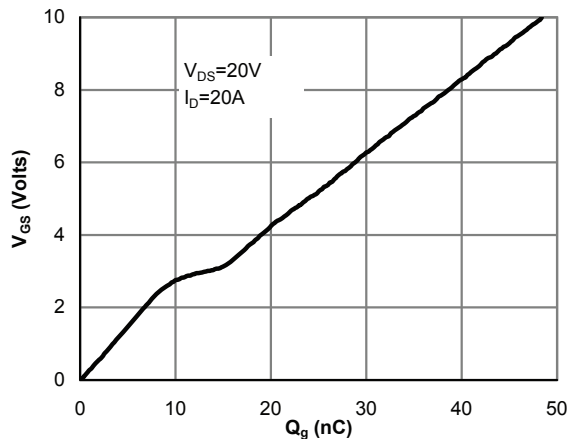


Figure 7: Gate-Charge Characteristics

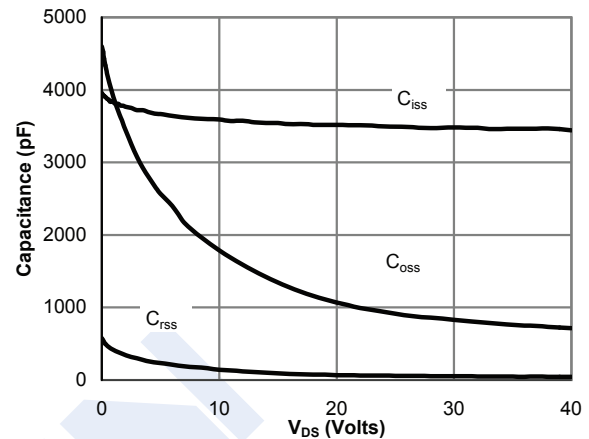


Figure 8: Capacitance Characteristics

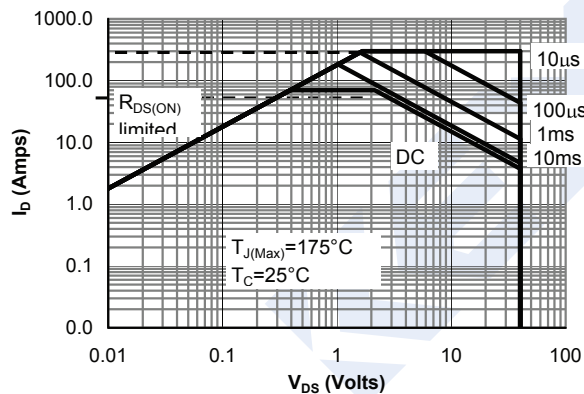


Figure 9: Maximum Forward Biased Safe Operating Area (Note 7)

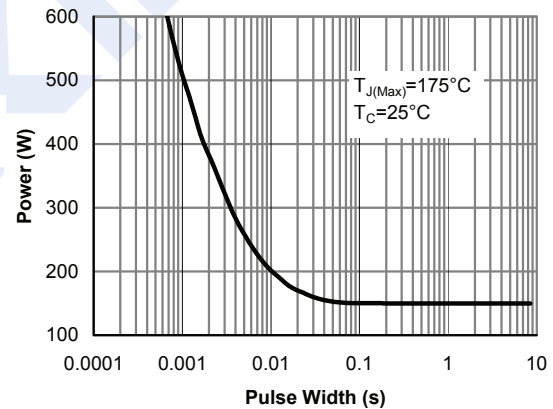


Figure 10: Single Pulse Power Rating Junction-to-Case (Note 7)

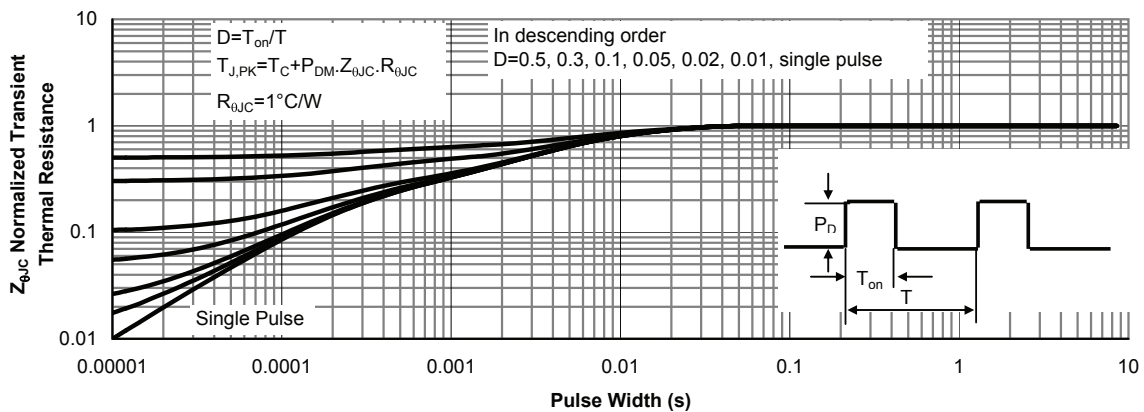


Figure 11: Normalized Maximum Transient Thermal Impedance (Note 7)

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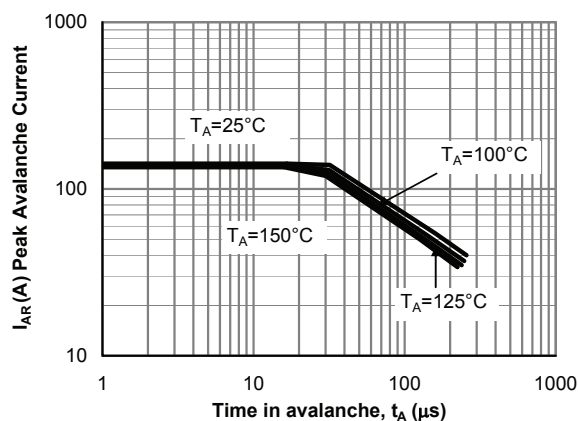


Figure 12: Single Pulse Avalanche capability

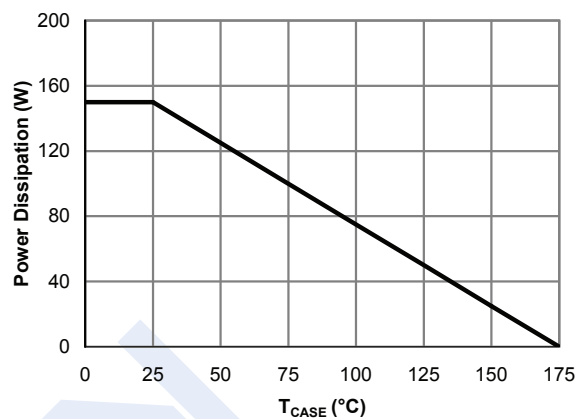


Figure 13: Power De-rating (Note 7)

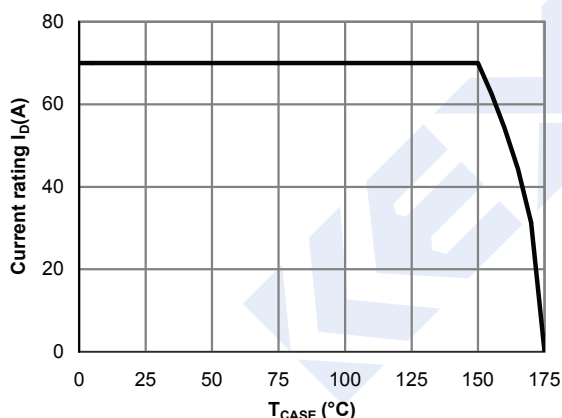


Figure 14: Current De-rating (Note 7)

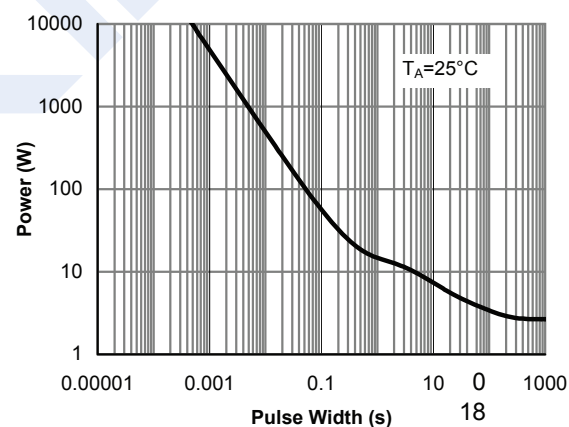


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note 8)

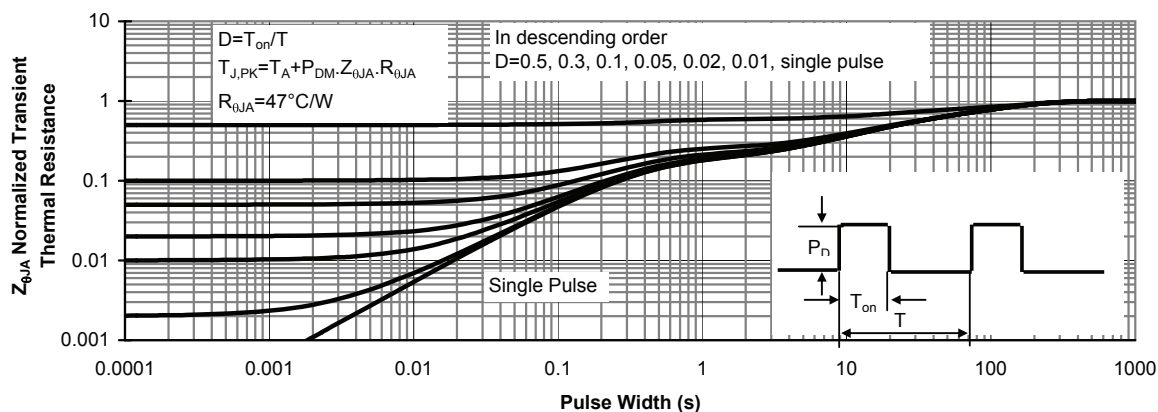
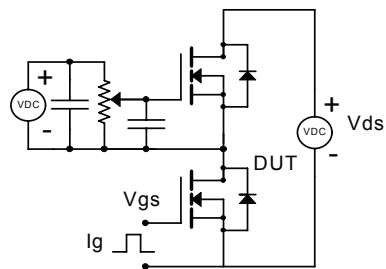
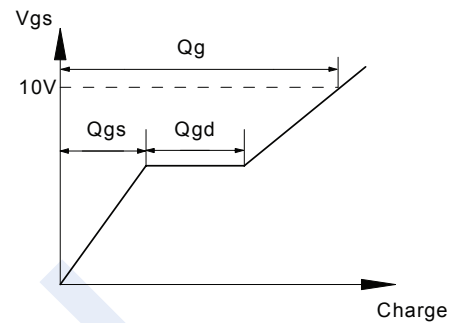


Figure 16: Normalized Maximum Transient Thermal Impedance (Note 8)

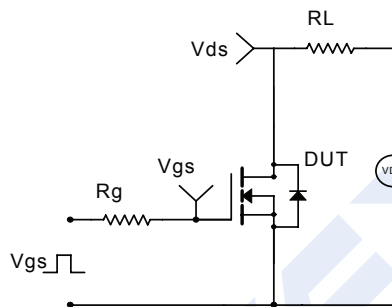
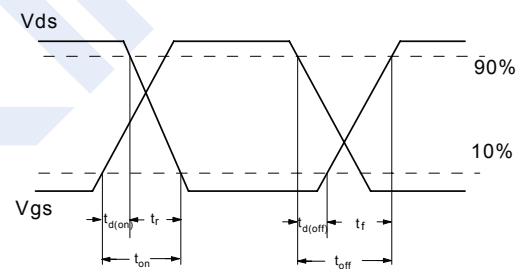
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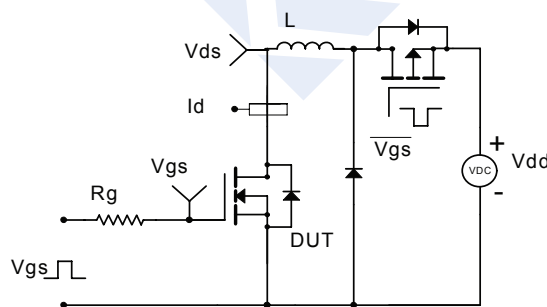
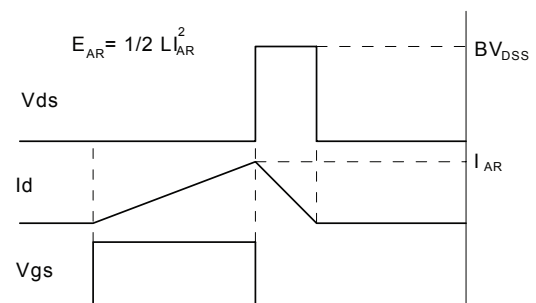
Gate Charge Test Circuit & Waveform



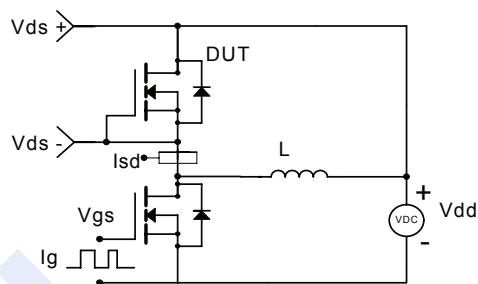
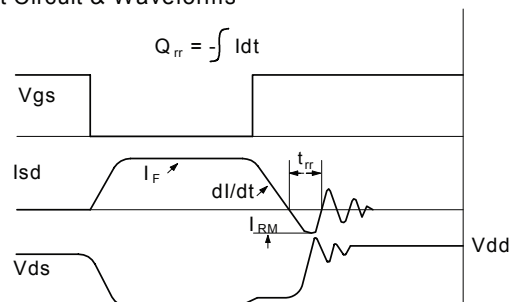
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



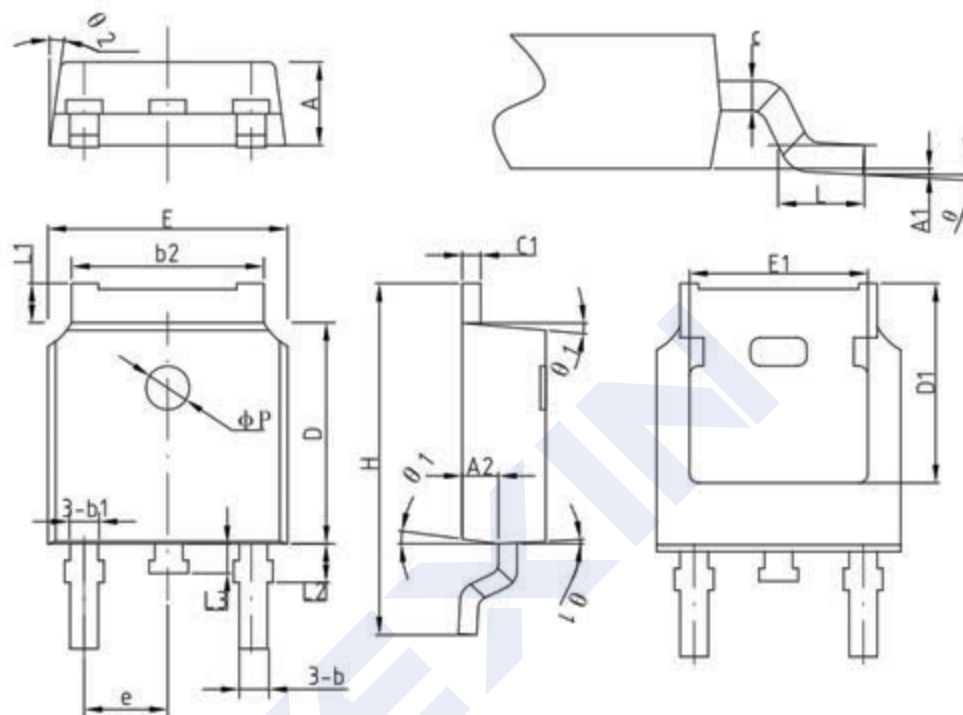
N-Channel MOSFET

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■ Package Dimension

TO-252

Units: mm



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.2	2.30	2.38
A1	0	—	0.10
A2	0.90	1.01	1.10
b	0.71	0.76	0.86
b1		0.76	
b2	5.13	5.33	5.46
c	0.47	0.50	0.60
c1	0.47	0.50	0.60
D	6.0	6.10	6.20
D1	—	5.30	—
E	6.50	6.60	6.70
E1	—	4.80	—
e	2.286BSC		
H	9.70	10.10	10.40
L	1.40	1.50	1.70
L1	0.90	—	1.25
L2		1.05	
L3		0.8	
ϕP		1.2	
θ	0°	—	8°
θ_1	5°	7°	9°
θ_2	5°	7°	9°