

Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Gate-source voltage	V_{GS}	± 30	V
Continuous drain current ¹⁾ , $T_C=25^\circ\text{C}$	I_D	7	A
Continuous drain current ¹⁾ , $T_C=100^\circ\text{C}$		4.4	
Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	21	A
Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$	I_S	7	A
Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$	$I_{S, pulse}$	21	A
Power dissipation ³⁾ , $T_C=25^\circ\text{C}$	P_D	37	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	130	mJ
MOSFET dv/dt ruggedness, $V_{DS} \leq 100\text{V}$, $I_D = 0\text{A}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS} \leq 100\text{V}$, $I_S = 0\text{A}$	dv/dt	15	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	3.4	$^\circ\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	62	$^\circ\text{C/W}$

Electrical Characteristics at $T_j=25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	650			V	$V_{GS}=0\text{V}, I_D=250\text{A}$
		700	750			$V_{GS}=0\text{V}, I_D=10\text{A}, T_j=150^\circ\text{C}$
Gate threshold voltage	$V_{GS(th)}$	2.0		4.0	V	$V_{DS}=V_{GS}, I_D=250\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		0.66	0.76		$V_{GS}=10\text{V}, I_D=3.5\text{A}$
			1.6			$V_{GS}=10\text{V}, I_D=3.5\text{A},$

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		354.2		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}		31.4		pF	
Reverse transfer capacitance	C_{rss}		1.54		pF	
Turn-on delay time	$t_{d(on)}$		17.6		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=25\ \Omega$, $I_D=5\text{ A}$
Rise time	t_r		11.4		ns	
Turn-off delay time	$t_{d(off)}$		27.2		ns	
Fall time	t_f		24.4		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		7.4		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=5\text{ A}$
Gate-source charge	Q_{gs}		1.9		nC	
Gate-drain charge	Q_{gd}		3.3		nC	
Gate plateau voltage	$V_{plateau}$		5.9		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=7\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		146		ns	$I_S=5\text{ A}$, $dI/dt=100\text{ A/}\mu\text{s}$
Reverse recovery charge	Q_{rr}		0.98		C	
Peak reverse recovery current	I_{rrm}		11.6		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of $R_{\theta JC}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=50\text{ V}$, $V_{GS}=10\text{ V}$, $L=20\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

<p>Figure 1. Typ. output characteristics</p>	<p>Figure 2. Typ. transfer characteristics</p>
<p>Figure 3. Typ. capacitances</p>	<p>Figure 4. Typ. gate charge</p>

Figure 5. Drain-source breakdown voltage

Figure 6. Drain-source on-state resistance

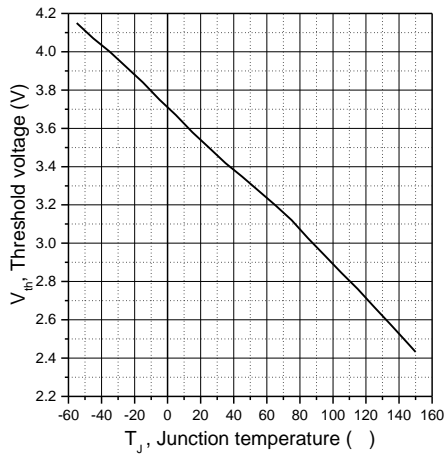


Figure 7. Threshold voltage

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Figure 8. Forward characteristic of body diode

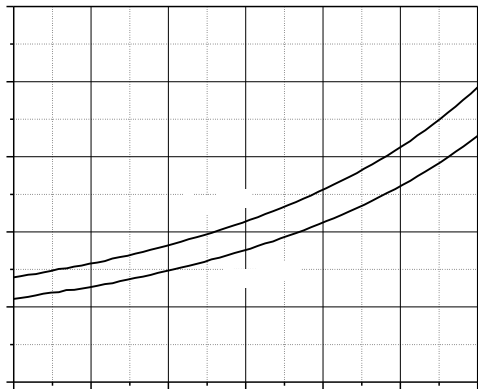


Figure 9. Drain-source on-state resistance

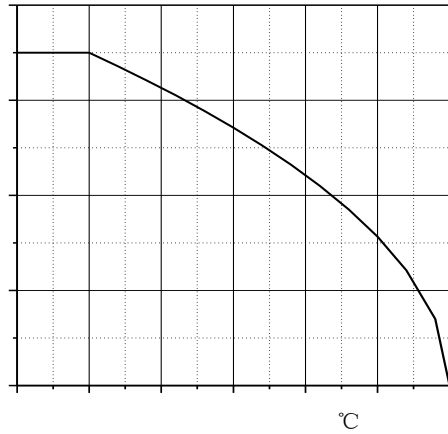


Figure 10. Drain current

DS(ON)

Figure 11. Safe operation area T_c=25 °C

Test circuits and waveforms

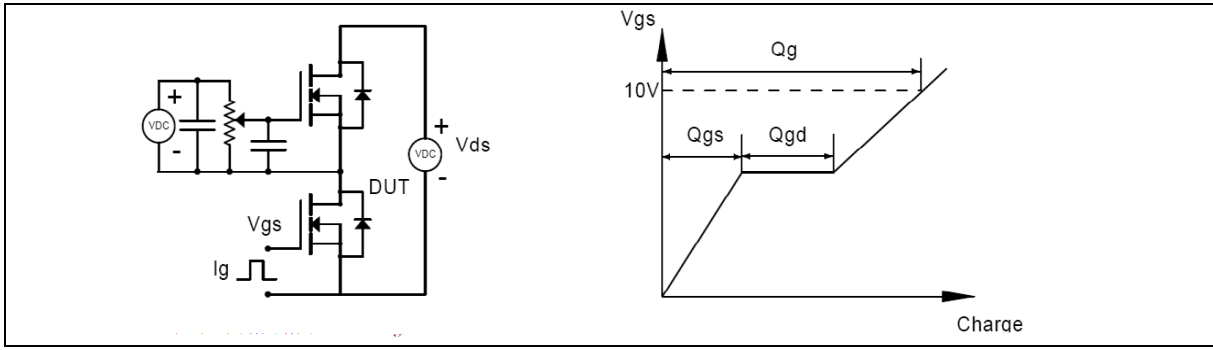


Figure 1. Gate charge test circuit & waveform

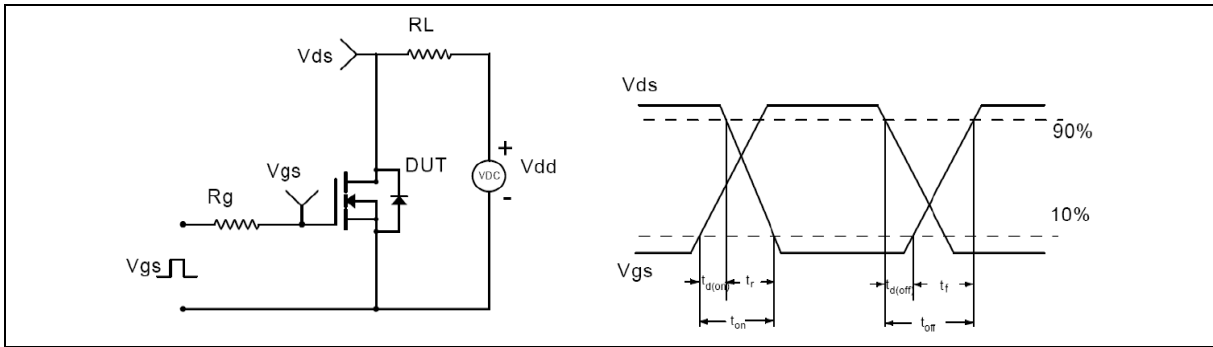


Figure 2. Switching time test circuit & waveforms

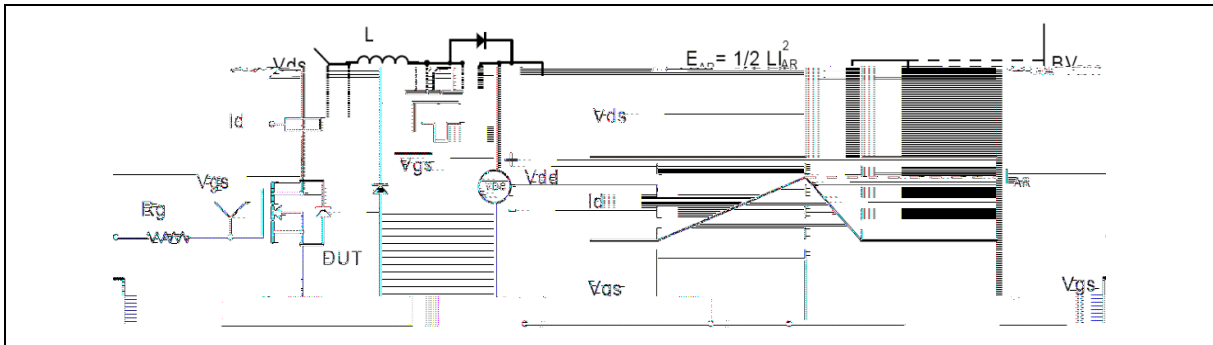


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

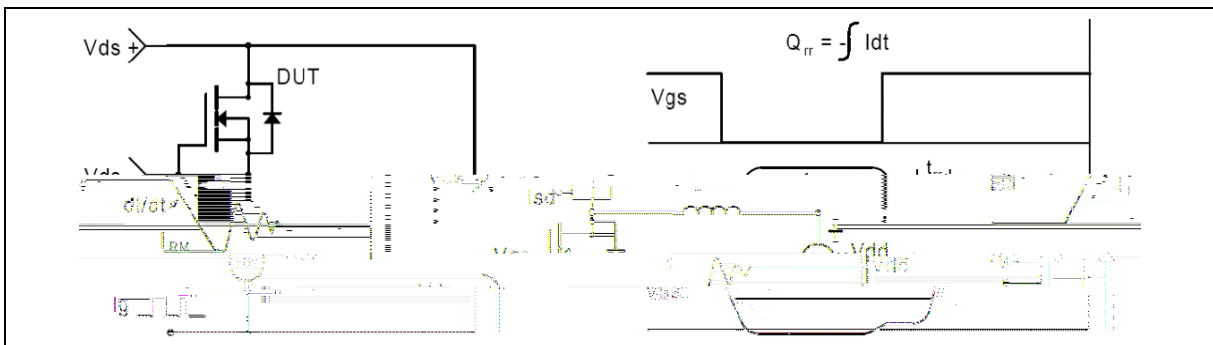
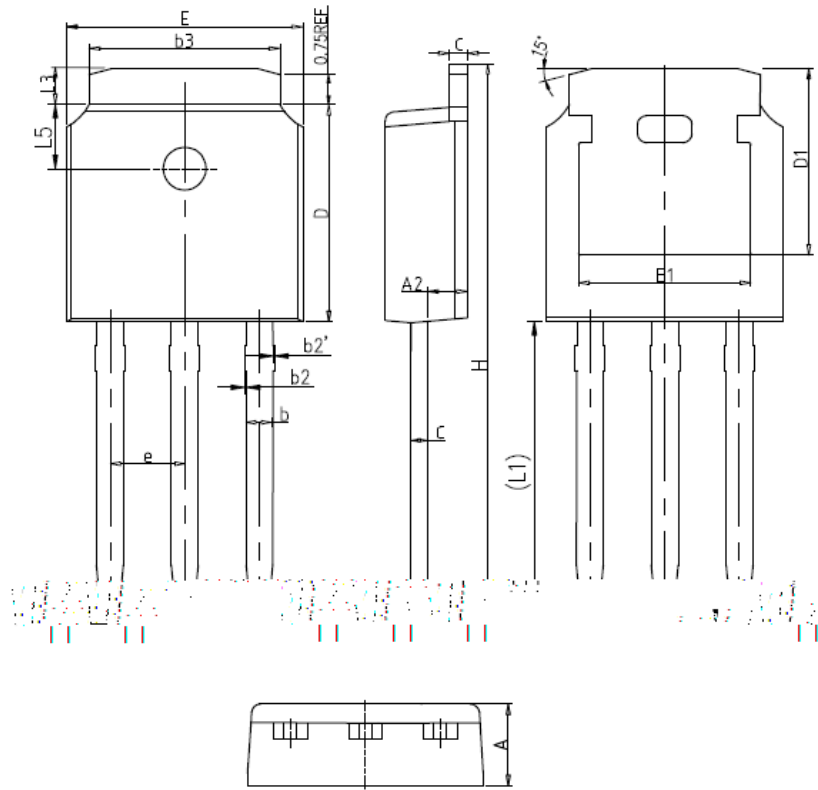


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.40
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b2	0.00	0.04	0.10
b2'	0.00	0.04	0.10
b3	5.20	5.33	5.50
c	0.43	0.53	0.63
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.80
E1	4.63	-	-
e	2.286BSC		
H	16.22	16.52	16.82
L1	9.15	9.40	9.65
L3	0.88	1.02	1.28
L5	1.65	1.80	1.95

Version 1: TO251-C package outline dimension

