

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Тур.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40			V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_{J}$	Breakdown Voltage Temp. Coefficient		0.032		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		4.3	5.5	$m\Omega$	V _{GS} = 10V, I _D = 75A ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0		4.0	V	$V_{DS} = V_{GS}$, $I_D = 250\mu A$
gfs	Forward Trans conductance	63			S	$V_{DS} = 10V, I_{D} = 75A$
I _{DSS}	Drain-to-Source Leakage Current			20		V_{DS} =40V, V_{GS} = 0V
				250	μA	$V_{DS} = 40V, V_{GS} = 0V, T_{J} = 125^{\circ}C$
	Gate-to-Source Forward Leakage Gate-to-Source Reverse Leakage			200	n ^	V _{GS} = 20V
I _{GSS}				-200		V _{GS} = -20V

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

-	•	•	•		
Q_g	Total Gate Charge	 68	100		I _D = 75A
Q_{gs}	Gate-to-Source Charge	 21		nC	$V_{DS} = 32V$
Q_{gd}	Gate-to-Drain Charge	 27			V _{GS} = 10V3
$t_{d(on)}$	Turn-On Delay Time	 16			$V_{DD} = 20V$
t_r	Rise Time	 130		no	I _D = 75A
$t_{d(off)}$	Turn-Off Delay Time	 38		ns	$R_G = 6.8\Omega$
t _f	Fall Time	 77			V _{GS} = 10V ③
L _D	Internal Drain Inductance	 4.5		nΗ	Between lead, 6mm (0.25in.)
L _S	Internal Source Inductance	 7.5			from package and center of die contact
C _{iss}	Input Capacitance	 3000			$V_{GS} = 0V$
C_{oss}	Output Capacitance	 660			$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	 380		ъг	f = 1.0MHz, See Fig. 5
C _{oss}	Output Capacitance	 2160		-	$V_{GS} = 0V, V_{DS} = 1.0V f = 1.0MHz$
C_{oss}	Output Capacitance	 560			$V_{GS} = 0V$, $V_{DS} = 32V$ $f = 1.0MHz$
Coss eff.	Effective Output Capacitance	 850			$V_{GS} = 0V, V_{DS} = 0V \text{ to } 32V $

Diode Characteristics

	Parameter	Min.	Тур.	Max.	Units	Conditions
I _S	Continuous Source Current			75		MOSFET symbol
is	(Body Diode)			13	A	showing the
	Pulsed Source Current		470	^	integral reverse	
I _{SM}	(Body Diode) ①			470		p-n junction diode.
V_{SD}	Diode Forward Voltage			1.3	V	$T_J = 25^{\circ}C, I_S = 75A, V_{GS} = 0V$ ③
t _{rr}	Reverse Recovery Time		23	35	ns	$T_J = 25^{\circ}C$, $I_F = 75A$, $V_{DD} = 20V$
Q_{rr}	Reverse Recovery Charge		6.8	10	nC	di/dt = 100A/µs ③
t _{on}	Forward Turn-On Time	Intrinsio	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)			

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② Limited by T_{Jmax} , starting T_J = 25°C, L = 0.04mH, R_G = 25 Ω , I_{AS} = 75A, V_{GS} =10V. Part not recommended for use above this value.
- Coss eff. is a fixed capacitance that gives the same charging time as Coss while VDS is rising from 0 to 80% VDSS.
- \odot This value determined from sample failure population, $T_J = 25^{\circ}C$, L = 0.04mH, $R_G = 25\Omega$, $I_{AS} = 75$ A, $V_{GS} = 10$ V.
- © This is applied to D²Pak When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994
- $\ensuremath{\mathfrak{D}}$ R₀ is measured at T_J of approximately 90°C
- This is only applied to TO-220AB package.
- © Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 75A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements. (Refer to AN-1140)

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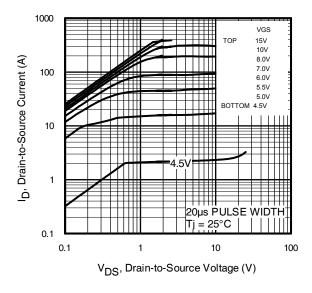


Fig. 1 Typical Output Characteristics

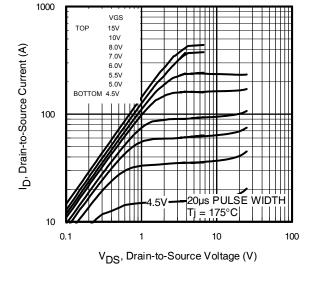


Fig. 2 Typical Output Characteristics

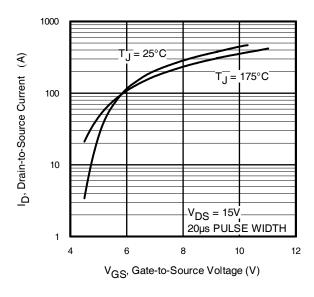


Fig. 3 Typical Transfer Characteristics

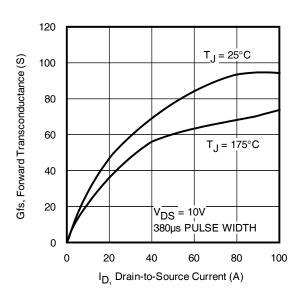


Fig. 4 Typical Forward Transconductance vs. Drain Current



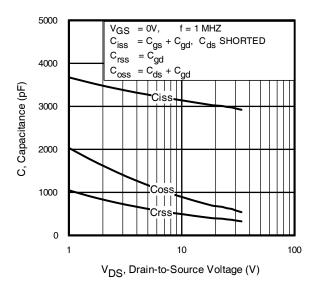


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

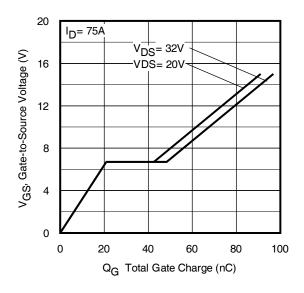


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

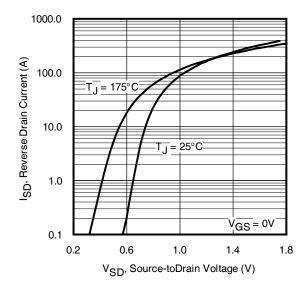


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

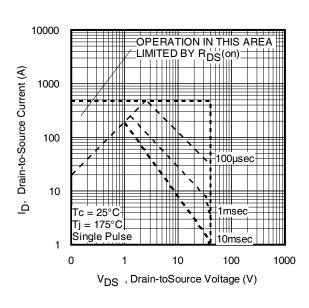
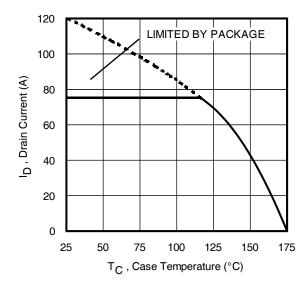


Fig 8. Maximum Safe Operating Area





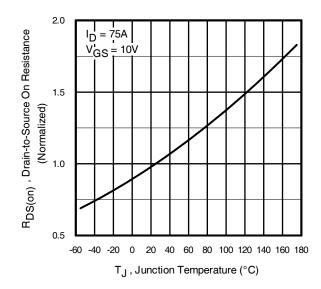


Fig 9. Maximum Drain Current vs. Case Temperature

Fig 10. Normalized On-Resistance vs. Temperature

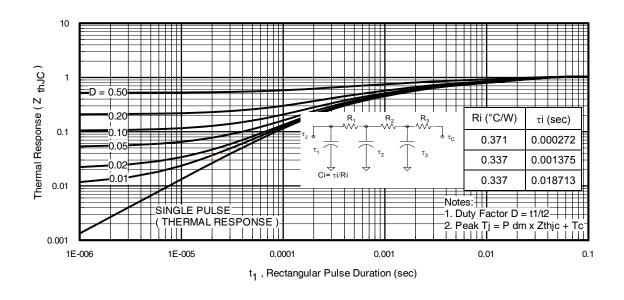


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case



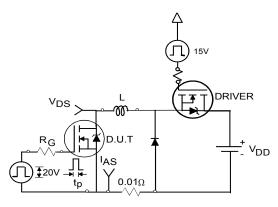


Fig 12a. Unclamped Inductive Test Circuit

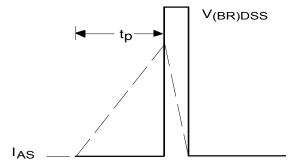


Fig 12b. Unclamped Inductive Waveforms

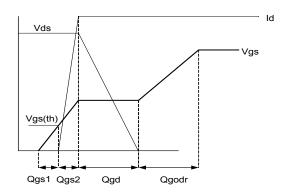


Fig 13a. Gate Charge Waveform

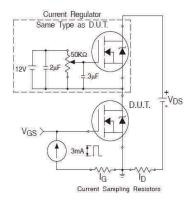


Fig 13b. Gate Charge Test Circuit

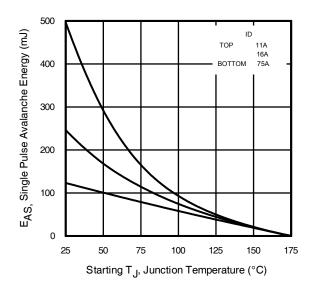


Fig 12c. Maximum Avalanche Energy vs. Drain Current

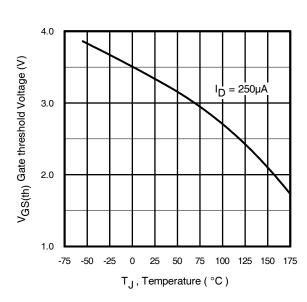


Fig 14. Threshold Voltage vs. Temperature

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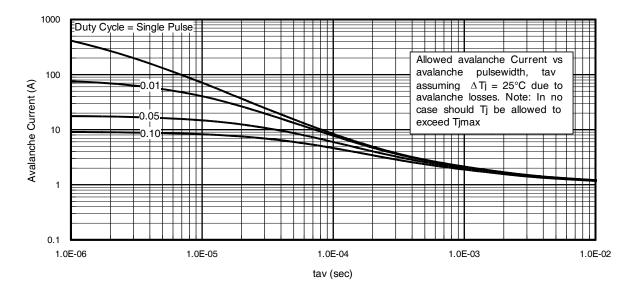


Fig 15. Typical Avalanche Current vs. Pulse width

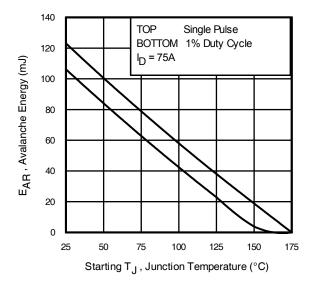


Fig 16. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 15, 16: (For further info, see AN-1005 at www.infineon.com)

- Avalanche failures assumption:
 Purely a thermal phenomenon and failure occurs at a temperature far in excess of T_{jmax}. This is validated for every part type.
- 2. Safe operation in Avalanche is allowed as long as T_{jmax} is not exceeded.
- 3. Equation below based on circuit and waveforms shown in Figures 12a, 12b.
- 4. PD (ave) = Average power dissipation per single avalanche pulse.
- 5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
- 6. lav = Allowable avalanche current.
- 7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 15, 16).

tav = Average time in avalanche.

D = Duty cycle in avalanche = tav ·f

ZthJC(D, tav) = Transient thermal resistance, see Figures 13)

$$\begin{split} P_{D \; (ave)} &= 1/2 \; (\; 1.3 \cdot BV \cdot I_{av}) = \Delta T / \; Z_{thJC} \\ I_{av} &= 2\Delta T / \; [1.3 \cdot BV \cdot Z_{th}] \\ E_{AS \; (AR)} &= P_{D \; (ave)} \cdot t_{av} \end{split}$$



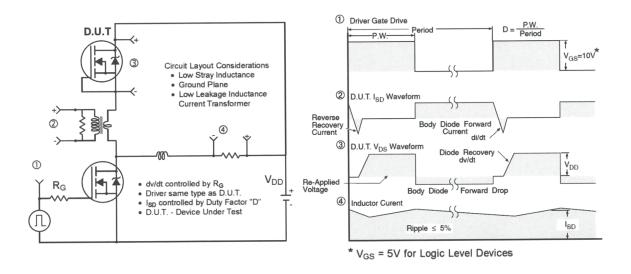


Fig 17. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

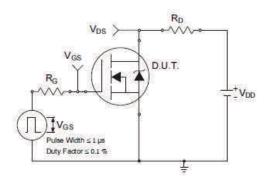


Fig 18a. Switching Time Test Circuit

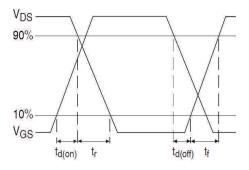
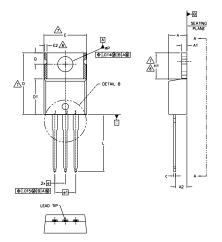
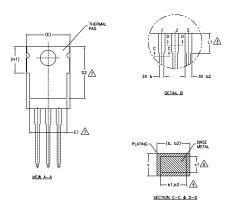


Fig 18b. Switching Time Waveforms



TO-220AB Package Outline (Dimensions are shown in millimeters (inches))





NOTES:

- DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.

- DIMENSIONING AND TOLERANGING AS PER ASME 114.5 M = 1994.

 DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].

 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.

 DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH

 SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.

DIMENSION 61, 63 & c1 APPLY TO BASE METAL ONLY.

- CONTROLLING DIMENSION: INCHES.
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1
- DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	MILLIMETERS		INC	HES	
	MIN.	MAX.	MIN.	MAX.	NOTES
Α	3.56	4.83	.140	.190	
A1	1,14	1.40	.045	.055	
A2	2.03	2.92	.080	.115	
b	0.38	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
b3	1.14	1.73	.045	.068	5
С	0.36	0.61	.014	.024	
c1	0.36	0.56	.014	.022	5
D	14.22	16.51	.560	.650	4
D1	8.38	9.02	.330	.355	
D2	11.68	12.88	.460	.507	7
E	9.65	10.67	.380	.420	4,7
E1	6.86	8.89	.270	.350	7
E2	-	0.76	_	.030	8
e	2.54	BSC BSC	.100 .200	BSC BSC	
e1	5.08	BSC	.200	BSC	
H1	5.84	6.86	.230	.270	7,8
L	12.70	14.73	.500	.580	
L1	3.56	4.06	.140	.160	3
ØΡ	3.54	4.08	.139	.161	
Q	2.54	3.42	.100	.135	

LEAD ASSIGNMENTS

HEXFET

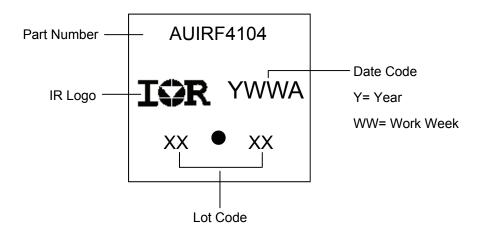
- 1.- GATE 2.- DRAIN 3.- SOURCE

IGBTs, CoPACK

1.- GATE 2.- COLLECTOR 3.- EMITTER

- DIODES
- 1.- ANODE 2.- CATHODE 3.- ANODE

TO-220AB Part Marking Information

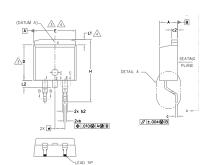


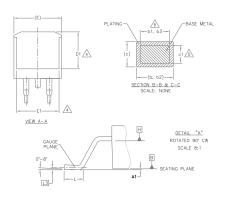
TO-220AB package is not recommended for Surface Mount Application.

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D²Pak (TO-263AB) Package Outline (Dimensions are shown in millimeters (inches))





- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- 2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.

4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.

5. DIMENSION 61, 63 AND c1 APPLY TO BASE METAL ONLY.

- 6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
- 7. CONTROLLING DIMENSION: INCH.
- 8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263AB.

S	DIMENSIONS						
M B	MILLIMETERS		INC	O T E S			
0 L	MIN.	MAX.	MIN.	MAX.	S		
А	4.06	4.83	.160	.190			
A1	0.00	0.254	.000	.010			
Ь	0.51	0.99	.020	.039			
ь1	0.51	0.89	.020	.035	5		
b2	1.14	1.78	.045	.070			
b3	1.14	1.73	.045	.068	5		
С	0.38	0.74	.015	.029			
с1	0.38	0.58	.015	.023	5		
c2	1.14	1.65	.045	.065			
D	8.38	9.65	.330	.380	3		
D1	6.86	_	.270	_	4		
E	9.65	10.67	.380	.420	3,4		
E1	6.22	_	.245	_	4		
е	2.54	BSC	.100	BSC			
Н	14.61	15.88	.575	.625			
L	1.78	2.79	.070	.110			
L1	_	1.68	_	.066	4		
L2	_	1.78	_	.070			
L3	0.25	BSC	.010	BSC			

LEAD ASSIGNMENTS

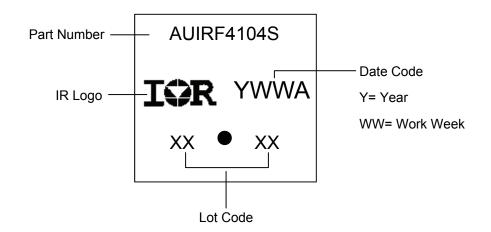
DIODES

1.- ANODE (TWO DIE) / OPEN (ONE DIE)
2, 4.- CATHODE
3.- ANODE

HEXFET

IGBTs, CoPACK 1.- GATE 2, 4.- DRAIN 3.- SOURCE 2, 4.- COLLECTOR 3.- EMITTER

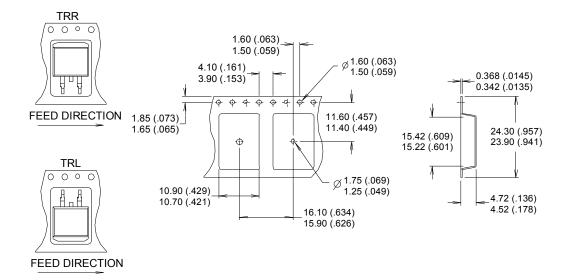
D²Pak (TO-263AB) Part Marking Information

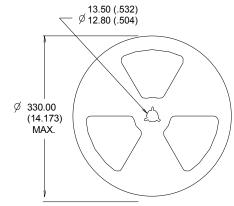


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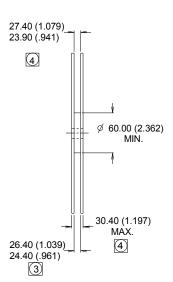
D²Pak (TO-263AB) Tape & Reel Information (Dimensions are shown in millimeters (inches))







- COMFORMS TO EIA-418. 2. CONTROLLING DIMENSION: MILLIMETER.
- 3
- DIMENSION MEASURED @ HUB.
 INCLUDES FLANGE DISTORTION @ OUTER EDGE.





Qualification Information

		Automotive (per AEC-Q101)				
		Comments: This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.				
Moisture Sensitivity Level		TO-220AB	N/A			
Worstare	Moisture Serisitivity Level		MSL1			
	Machine Model	Class M4 [†]				
	Iviaci ii ie iviodei	AEC-Q101-002				
FOD	Lluman Dady Madal	Class H1C [†]				
ESD	Human Body Model	AEC-Q101-001				
	Observed Davis a Madal	Class C3 [†]				
Charged Device Model		AEC-Q101-005				
RoHS Compliant		Yes				

† Highest passing voltage.

Revision History

Date	Comments			
09/30/2015	 Updated datasheet with corporate template Corrected ordering table on page 1. 			
09/22/2017	Corrected typo error on part marking on pages 9,10.			

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