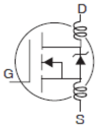
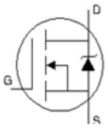
Static Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	55	——	——	V	V_{GS} = 0V, I_D = 250μA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	0.05	——	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$ SMD	Static Drain-to-Source On-Resistance	——	2.0	2.6	mΩ	V_{GS} = 10V, I_D = 140A ③
$V_{GS(th)}$	Gate Threshold Voltage	2.0	——	4.0	V	V_{DS} = V_{GS}, I_D = 250μA
gfs	Forward Transconductance	110	——	——	S	V_{DS} = 25V, I_D = 140A
I_{DSS}	Drain-to-Source Leakage Current	——	——	20	μA	V_{DS} = 55V, V_{GS} = 0V
		——	——	250		V_{DS} = 55V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -20V

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge	——	130	200	nC	I_D = 140A
Q_{gs}	Gate-to-Source Charge	——	53	——		V_{DS} = 44V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	49	——		V_{GS} = 10V ③
$t_{d(on)}$	Turn-On Delay Time	——	23	——	ns	V_{DD} = 28V
t_r	Rise Time	——	130	——		I_D = 140A
$t_{d(off)}$	Turn-Off Delay Time	——	80	——		R_G = 2.4Ω
t_f	Fall Time	——	52	——		V_{GS} = 10V ③
L_D	Internal Drain Inductance	——	4.5	——	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	——	7.5	——		
C_{iss}	Input Capacitance	——	7820	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	1260	——		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	——	610	——		ƒ = 1.0 MHz, See Fig. 5
C_{oss}	Output Capacitance	——	4310	——		V_{GS} = 0V, V_{DS} = 1.0V, ƒ = 1.0MHz
C_{oss}	Output Capacitance		980			V_{GS} = 0V, V_{DS} = 44V, ƒ = 1.0MHz
C_{oss} eff.	Effective Output Capacitance ④	——	1540	——		V_{GS} = 0V, V_{DS} = 0V to 44V

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	240	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ②	——	——	1000		
V_{SD}	Diode Forward Voltage	——	——	1.3	V	T_J = 25°C, I_S = 140A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	45	68	ns	T_J = 25°C, I_F = 140A, V_{DD} = 28V
Q_{rr}	Reverse Recovery Charge	——	35	53	nC	di/dt = 100A/μs ③
t_{on}	Forward Turn-On Time	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 This value determined from sample failure population starting T_J = 25°C, L=0.043mH, R_G = 25Ω, I_{AS} = 140A,V_{GS} =10V.

③ Pulse width ≤ 1.0ms; duty cycle ≤ 2%.

④ Coss eff. is a fixed capacitance that gives the same charging time as Coss while V_{DS} is rising from 0 to 80% V_{DSS}.

⑤ This is applied to D^2Pak, when mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

⑥ R_θ is measured at T_J of approximately 90°C.

⑦ Solder mounted on IMS substrate.

⑧ Limited by T_{Jmax} starting T_J = 25°C, L=0.043mH, R_G = 25Ω, I_{AS} = 140A,V_{GS} =10V.Part not recommended for use above this value.

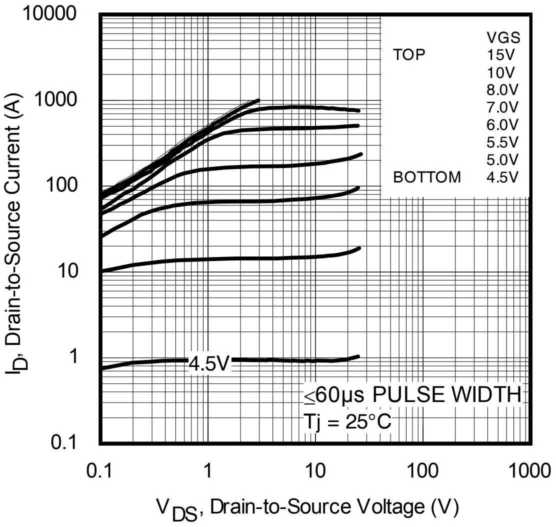


Fig. 1 Typical Output Characteristics

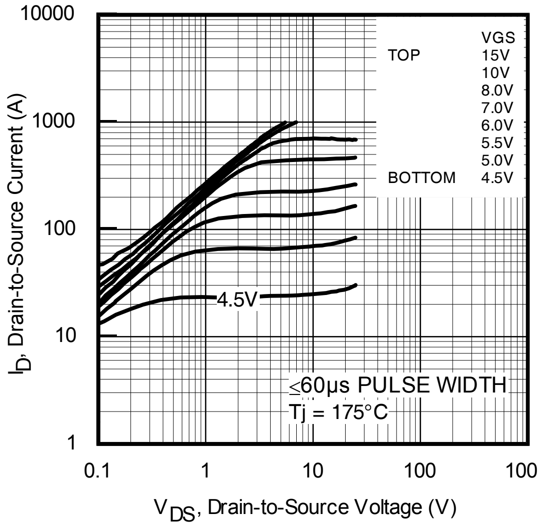


Fig. 2 Typical Output Characteristics

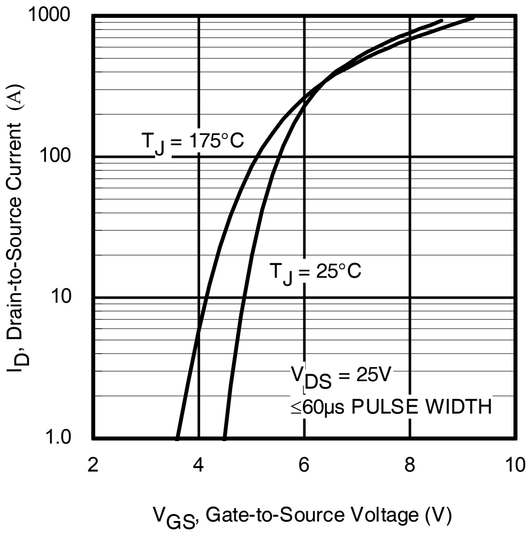


Fig. 3 Typical Transfer Characteristics

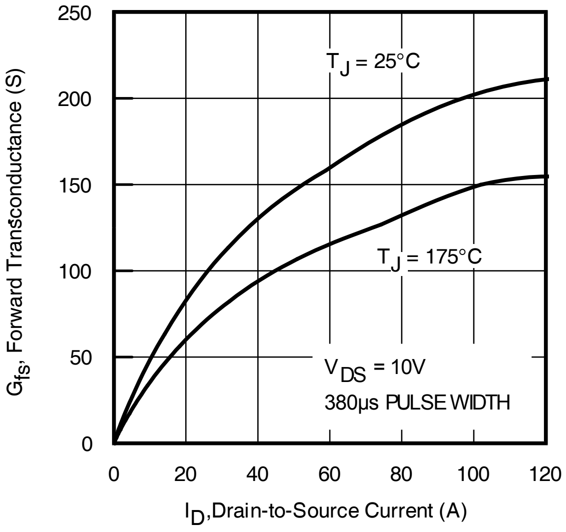


Fig. 4 Typical Forward Transconductance vs. Drain Current

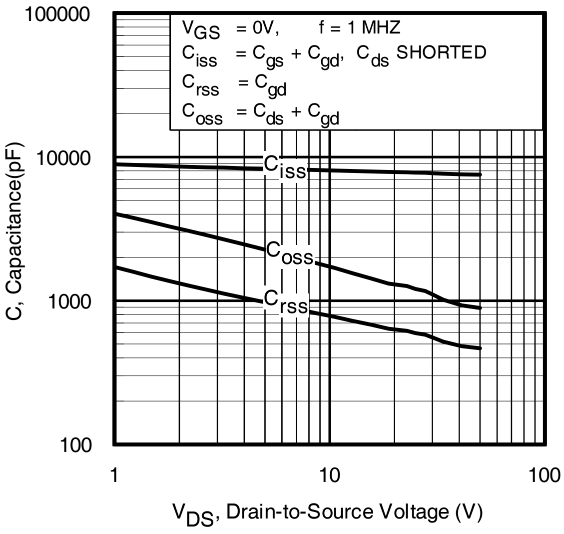


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

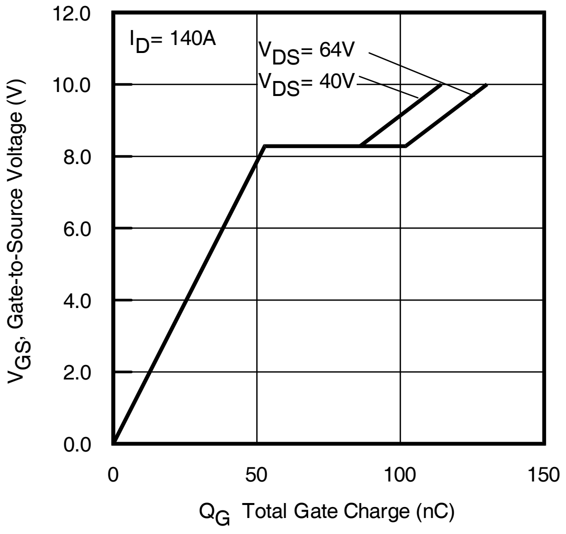


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

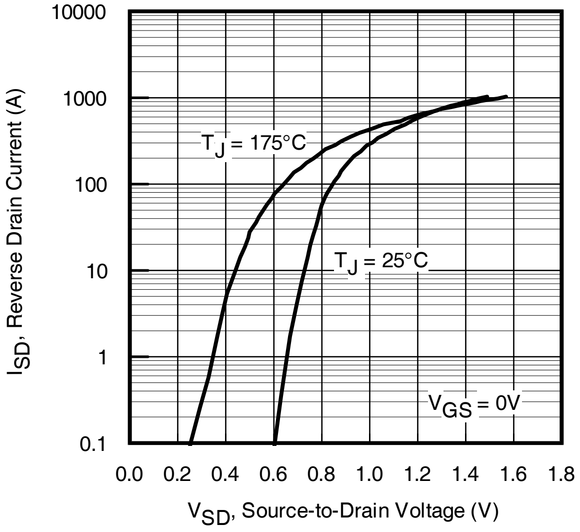


Fig. 7 Typical Source-to-Drain Diode
Forward Voltage

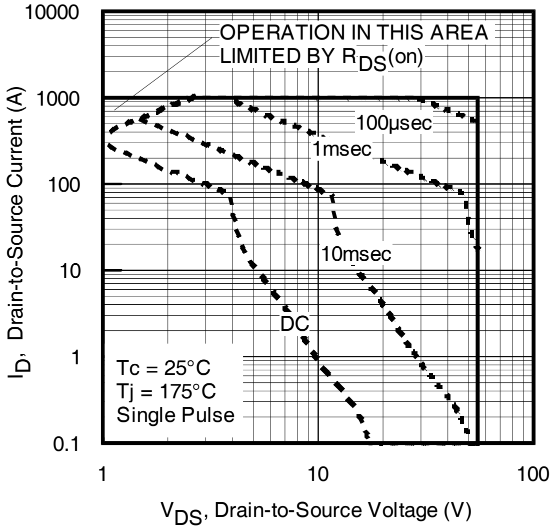


Fig 8. Maximum Safe Operating Area

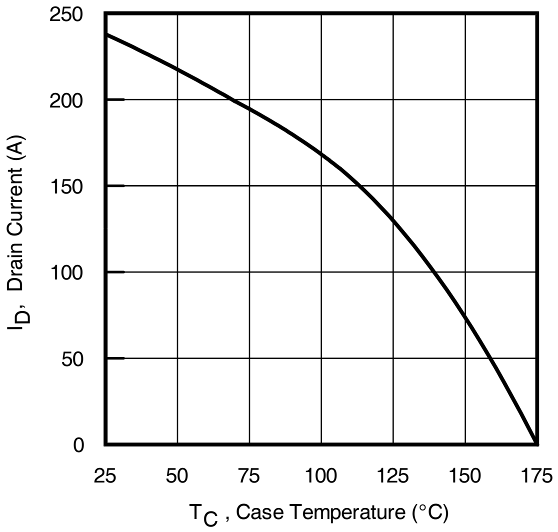


Fig 9. Maximum Drain Current vs. Case Temperature

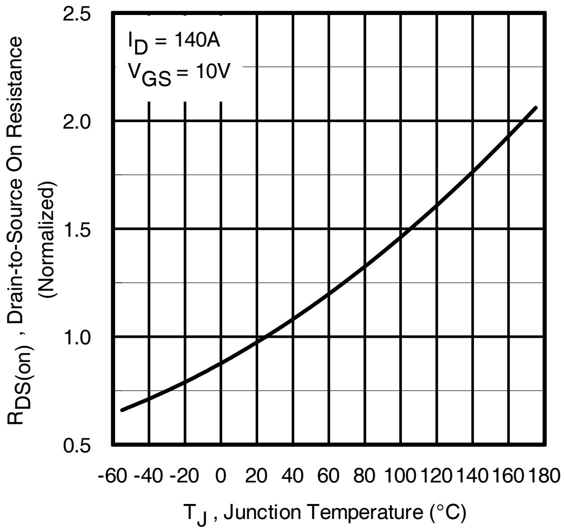
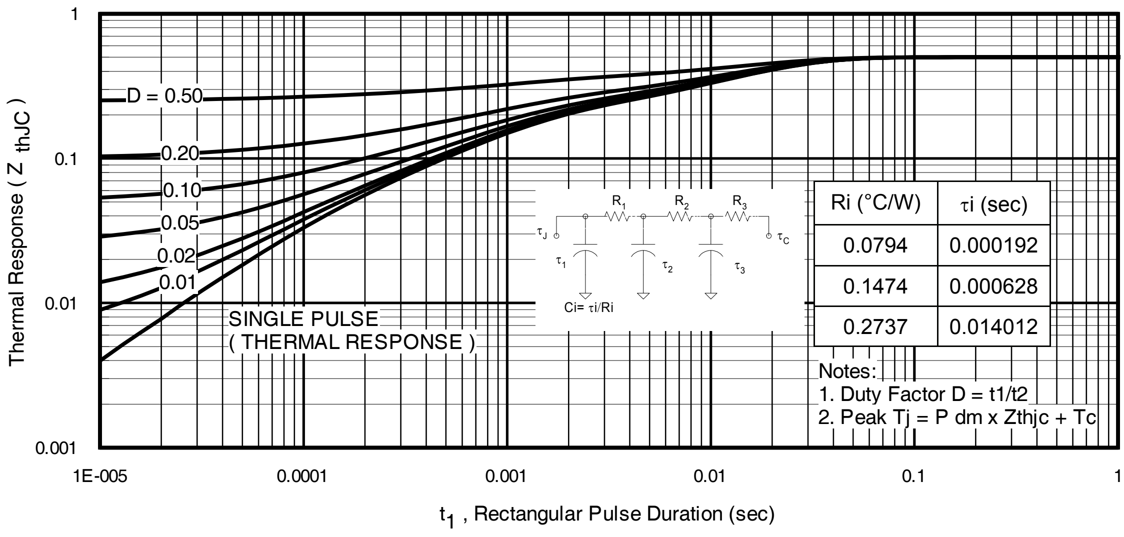


Fig 10. Normalized On-Resistance vs. Temperature



Ri (°C/W)	τi (sec)
0.0794	0.000192
0.1474	0.000628
0.2737	0.014012

Notes:
1. Duty Factor D = t1/t2
2. Peak Tj = P dm x Zthjc + Tc

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

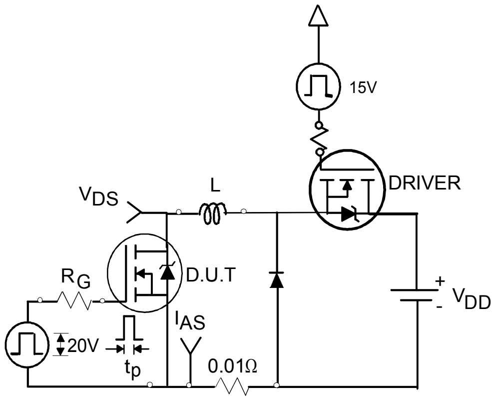


Fig 12a. Unclamped Inductive Test Circuit

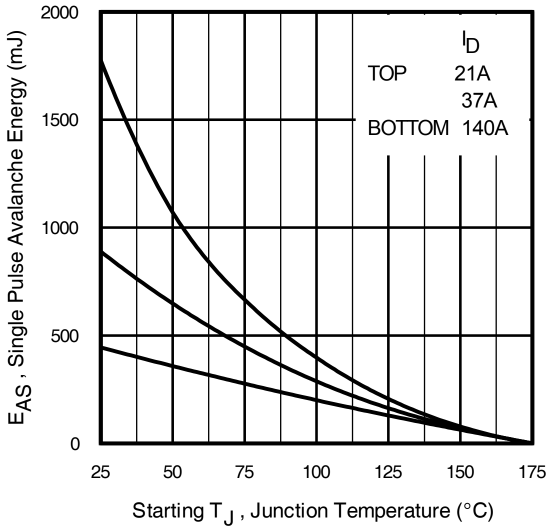


Fig 12c. Maximum Avalanche Energy

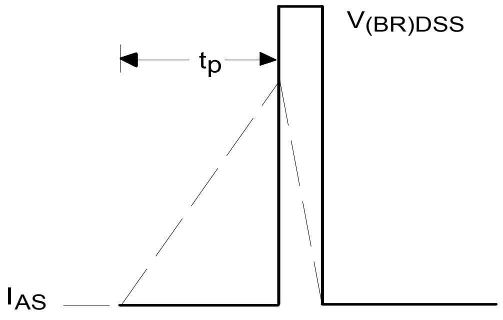


Fig 12b. Unclamped Inductive Waveforms

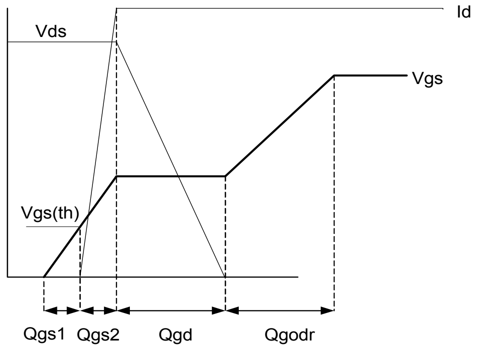


Fig 13a. Basic Gate Charge Waveform

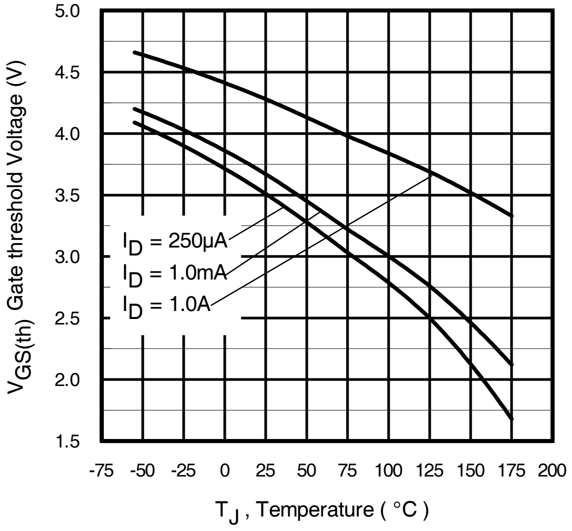


Fig 14. Threshold Voltage vs. Temperature

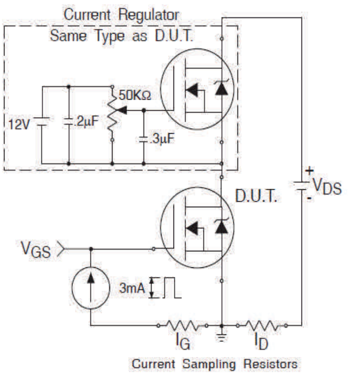


Fig 13b. Gate Charge Test Circuit

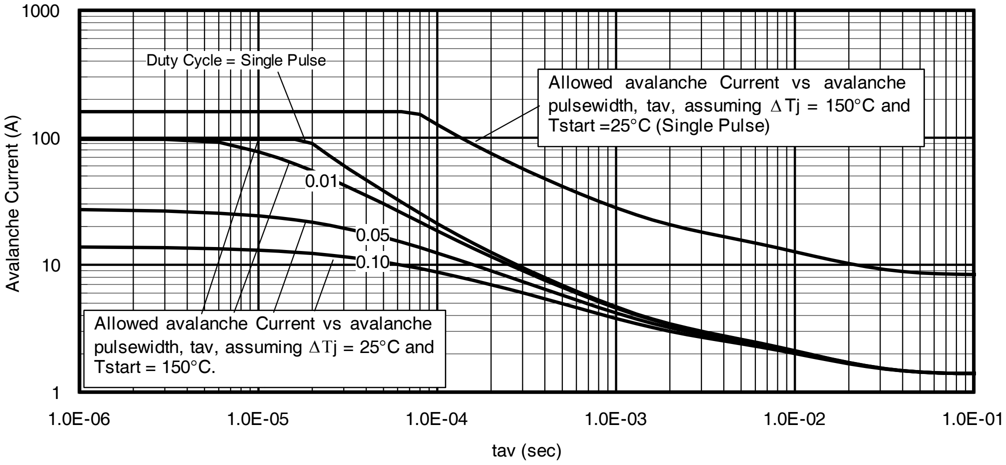


Fig 15. Typical Avalanche Current vs. Pulse width

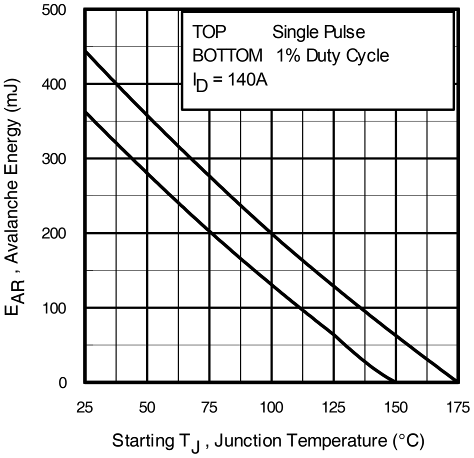
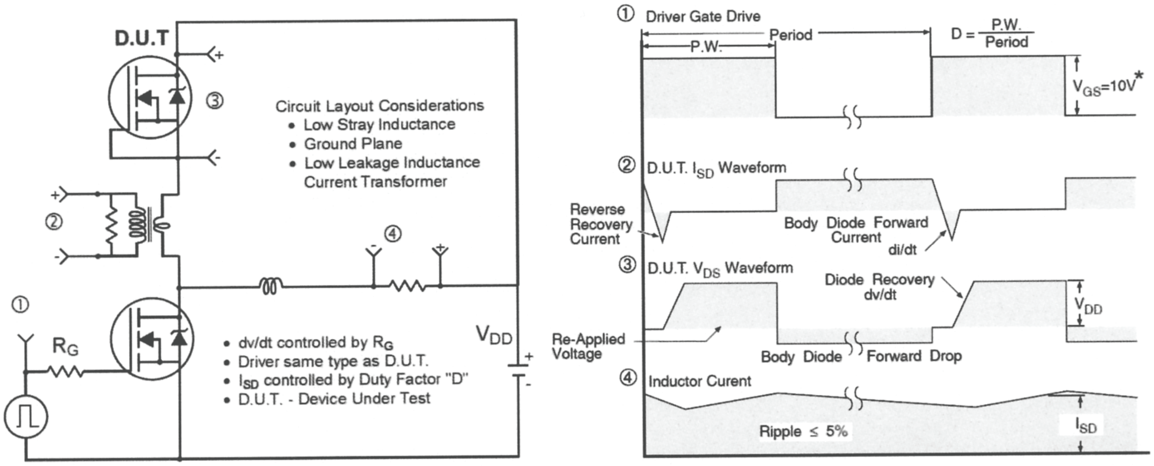


Fig 16. Maximum Avalanche Energy vs. Temperature

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

1. 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. $P_{D\ (ave)}$ = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6. I_{av} = Allowable avalanche current.
7. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 15, 16).
   t_{av} = Average time in avalanche.
   D = Duty cycle in avalanche = $t_{av} \cdot f$
   $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see Figures 11)

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



* V_{GS} = 5V for Logic Level Devices

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

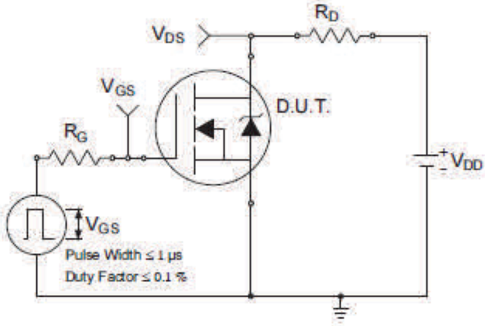


Fig 18a. Switching Time Test Circuit

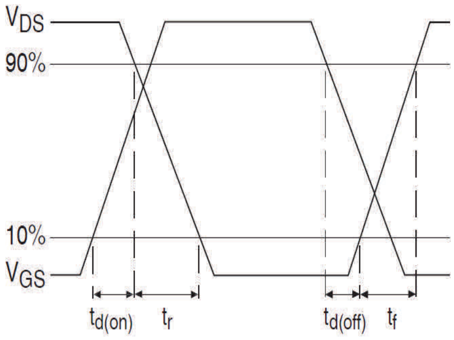
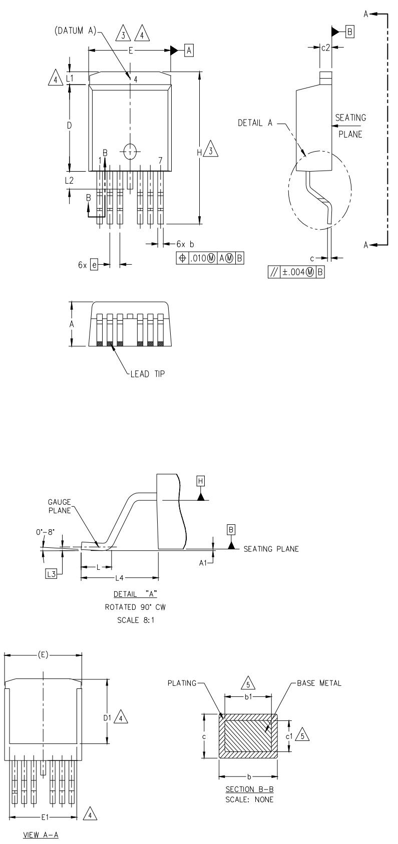


Fig 18b. Switching Time Waveforms

D^2Pak - 7 Pin Package Outline

Dimensions are shown in millimeters (inches)

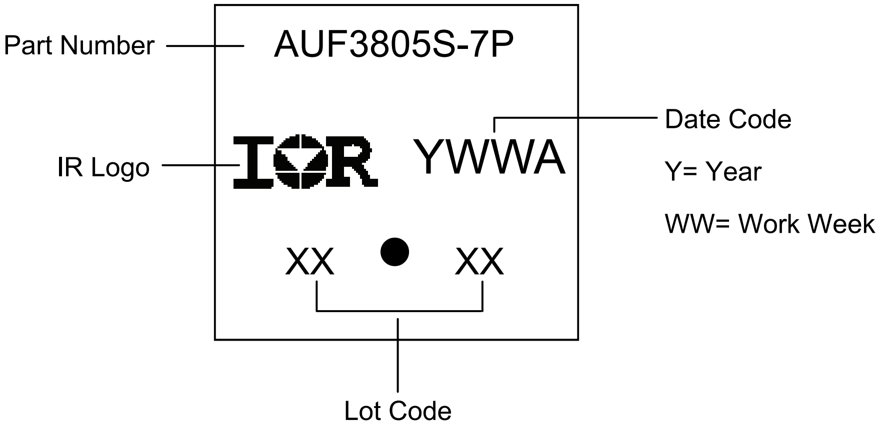


SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	–	0.254	–	.010	
b	0.51	0.99	.020	.036	
b1	0.51	0.89	.020	.032	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	–	.270		4
E	9.65	10.67	.380	.420	3,4
E1	6.22	–	.245		4
e	1.27 BSC		.050 BSC		
H	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		
L4	4.78	5.28	.188	.208	

NOTES:

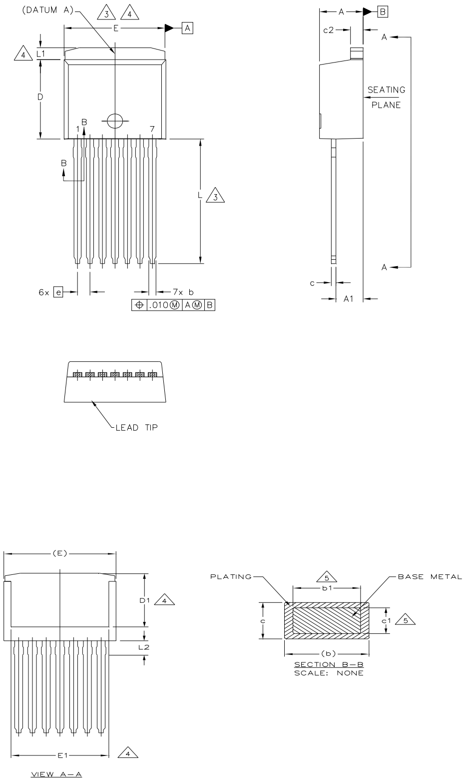
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 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-263CB.

D^2Pak - 7 Pin Part Marking Information



TO-263CA - 7 Pin Long Leads Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. CONTROLLING DIMENSION: INCH.
7. – OUTLINE CONFORM TO JEDEC TO–263 CA

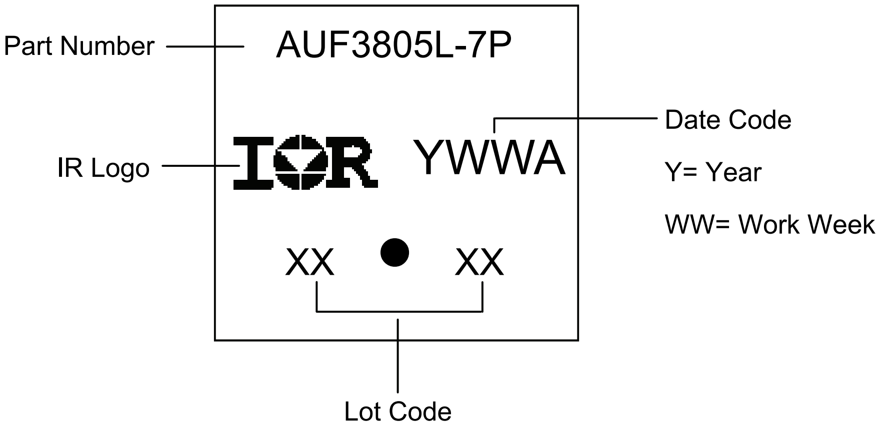
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	2.03	3.02	.080	.119	
b	0.51	0.91	.020	.036	
b1	0.51	0.81	.020	.032	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86	–	.270	–	4
E	9.65	10.67	.380	.420	3,4
E1	6.22	–	.245		4
e	1.27 BSC		.050 BSC		
L	13.46	14.10	.530	.555	
L1	–	1.65	–	.065	4
L2	–	6.35	–	.250	

LEAD ASSIGNMENTS

HEXFET

1.– GATE
2.– SOURCE
3.– SOURCE
4.– DRAIN
5.– SOURCE
6.– SOURCE
7.– SOURCE

TO-263CA - 7 Pin Part Marking Information

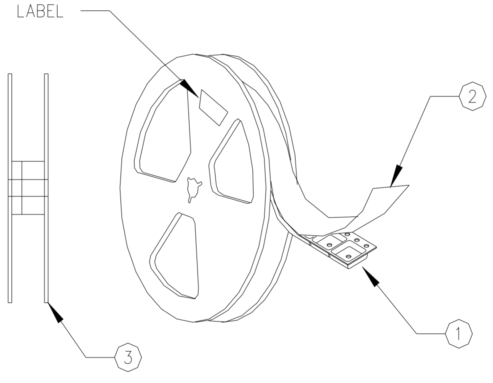


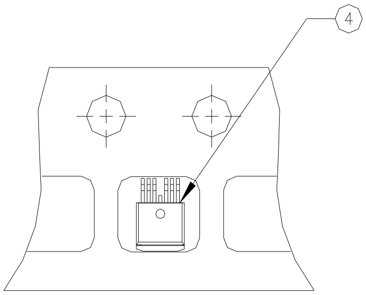
D2Pak - 7 Pin Tape and Reel

NOTES, TAPE & REEL, LABELLING:

1. TAPE AND REEL.
   - 1.1 REEL SIZE 13 INCH DIAMETER.
   - 1.2 EACH REEL CONTAINING 800 DEVICES.
   - 1.3 THERE SHALL BE A MINIMUM OF 42 SEALED POCKETS CONTAINED IN THE LEADER AND A MINIMUM OF 15 SEALED POCKETS IN THE TRAILER.
   - 1.4 PEEL STRENGTH MUST CONFORM TO THE SPEC. NO. 71-9667.
   - 1.5 PART ORIENTATION SHALL BE AS SHOWN BELOW.
   - 1.6 REEL MAY CONTAIN A MAXIMUM OF TWO UNIQUE LOT CODE/DATE CODE COMBINATIONS. REWORKED REELS MAY CONTAIN A MAXIMUM OF THREE UNIQUE LOT CODE/DATE CODE COMBINATIONS. HOWEVER, THE LOT CODES AND DATE CODES WITH THEIR RESPECTIVE QUANTITIES SHALL APPEAR ON THE BAR CODE LABEL FOR THE AFFECTED REEL.

2. LABELLING (REEL AND SHIPPING BAG).
   - 2.1 CUST. PART NUMBER (BAR CODE): IRFXXXXSTRL-7P
   - 2.2 CUST. PART NUMBER (TEXT CODE): IRFXXXXSTRL-7P
   - 2.3 I.R. PART NUMBER: IRFXXXXSTRL-7P
   - 2.4 QUANTITY:
   - 2.5 VENDOR CODE: IR
   - 2.6 LOT CODE:
   - 2.7 DATE CODE:





Qualification Information

Qualification Level		Automotive (per AEC-Q101)	
		Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
		D^2 PAK 7 Pin	MSL1, 260°C
ESD	Machine Model	Class M4(+/-425V)† (Per AEC-Q101-002)	
	Human Body Model	Class H3A(+/-4000V)† (per AEC-Q101-001)	
	Charged Device Model	Class C5 (+/-1000V)† (per AEC-Q101-005)	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Date	Comments
09/02/2015	• Updated data sheet with corporate template. • Corrected ordering table on page1.
09/30/2015	• Updated "Infineon" logo all pages. • Updated disclaimer on last page
10/09/2017	• Corrected typo error on part marking on page 9,10.

Published by
Infineon Technologies AG
81726 München, Germany

IMPORTANT NOTICE
The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.
In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.
The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.
For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).
WARNINGS
Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.
Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.