

Power MOSFET

PRODUCT SUMMARY

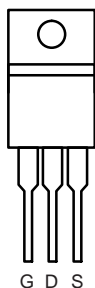
V_{DS} (V)	600	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	2.2
Q_g (Max.) (nC)	39	
Q_{gs} (nC)	10	
Q_{gd} (nC)	19	
Configuration	Single	

FEATURES

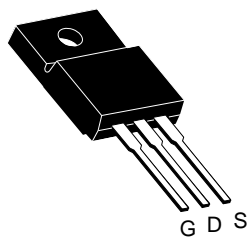
- Ultra Low Gate Charge
- Reduced Gate Drive Requirement
- Enhanced 30 V, V_{GS} Rating
- Reduced C_{iss} , C_{oss} , C_{rss}
- Extremely High Frequency Operation
- Repetitive Avalanche Rated
- Compliant to RoHS Directive 2002/95/EC



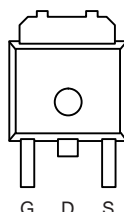
Available
RoHS*
 COMPLIANT

TO-220AB


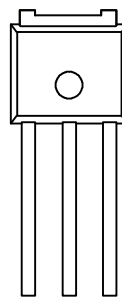
Top View

TO-220 FULLPAK


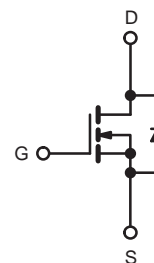
Top View

TO-252


Top View

TO-251


Top View



N-Channel MOSFET

DTP4N60 **DTP4N60F** **DTU4N60** **DTL4N60**

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current	I_D	$T_C = 25\text{ }^\circ\text{C}$	A
		$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^a	I_{DM}	25	
Linear Derating Factor		1.0	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b	E_{AS}	530	mJ
Repetitive Avalanche Current ^a	I_{AR}	6.2	A
Repetitive Avalanche Energy ^a	E_{AR}	13	mJ
Maximum Power Dissipation	P_D	125	W
Peak Diode Recovery dV/dt ^c	dV/dt	3.0	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature)	for 10 s	300 ^d	
Mounting Torque	6-32 or M3 screw	10	lbf · in
		1.1	N · m

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 25\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 6.2\text{ A}$ (see fig. 12).
- $I_{SD} \leq 6.2\text{ A}$, $dI/dt \leq 80\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	1.0	

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		600	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.70	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V		-	-	100	μA
		V _{DS} = 480 V, V _{GS} = 0 V, T _J = 125 °C		-	-	500	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 3.7 A ^b	-	-	2.2	Ω
Forward Transconductance	g _{fs}	V _{DS} = 100 V, I _D = 3.7 A ^b		3.7	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V V _{DS} = 25 V f = 1.0 MHz, see fig. 5		-	1100	-	pF
Output Capacitance	C _{oss}			-	140	-	
Reverse Transfer Capacitance	C _{rss}			-	15	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 4 A, V _{DS} = 360 V, see fig. 6 and 13 ^b	-	-	39	nC
Gate-Source Charge	Q _{gs}			-	-	10	
Gate-Drain Charge	Q _{gd}			-	-	19	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 300 V, I _D = 4 A R _g = 9.1 Ω, R _D = 47 Ω, see fig. 10 ^b		-	12	-	ns
Rise Time	t _r			-	20	-	
Turn-Off Delay Time	t _{d(off)}			-	27	-	
Fall Time	t _f			-	17	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact		-	4.5	-	nH
Internal Source Inductance	L _S			-	7.5	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	4.0	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	25	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 4 A, V _{GS} = 0 V ^b		-	-	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 4 A, dI/dt = 100 A/μs ^b		-	440	680	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	2.1	3.2	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
 b. Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

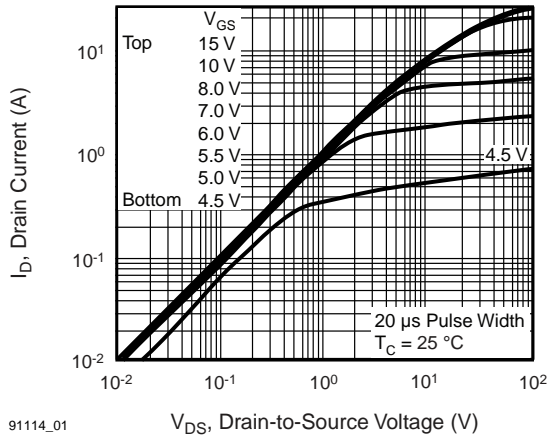


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ °C}$

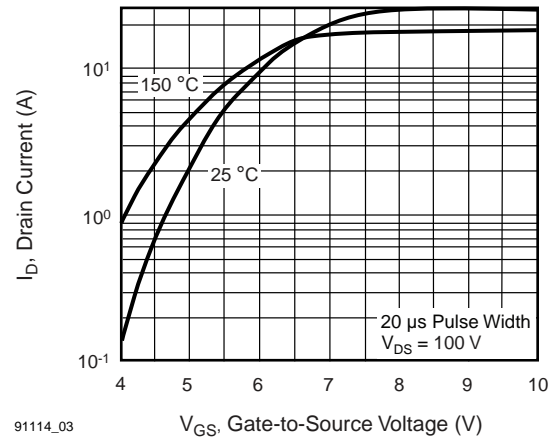


Fig. 3 - Typical Transfer Characteristics

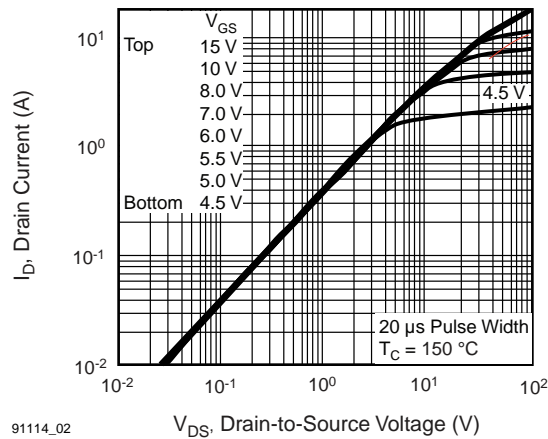


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ °C}$

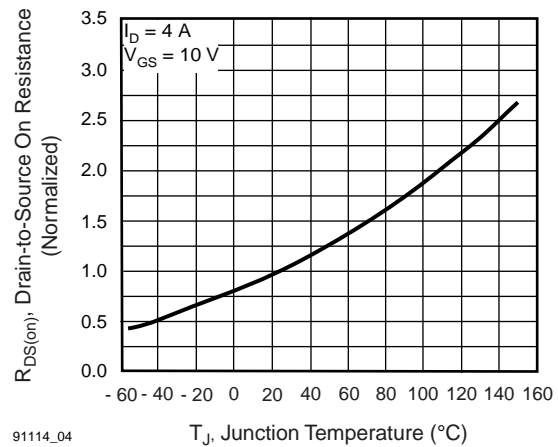


Fig. 4 - Normalized On-Resistance vs. Temperature

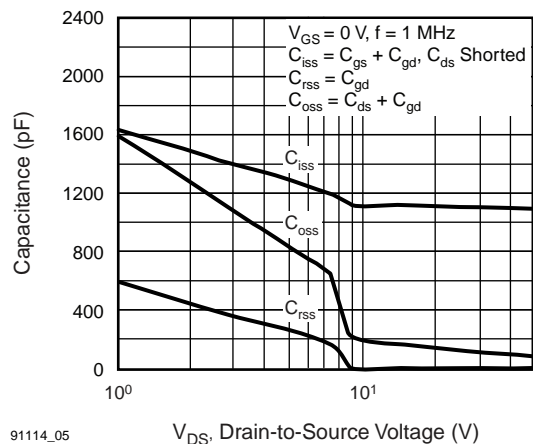


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

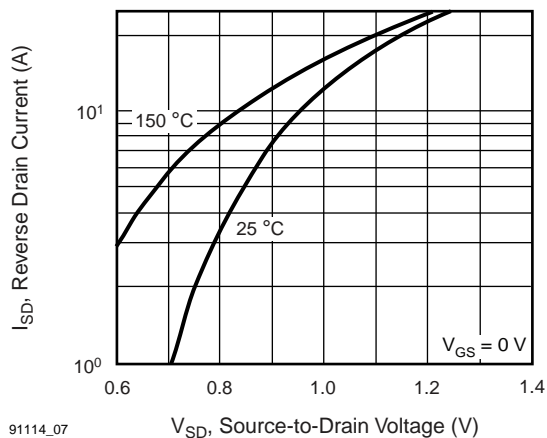


Fig. 7 - Typical Source-Drain Diode Forward Voltage

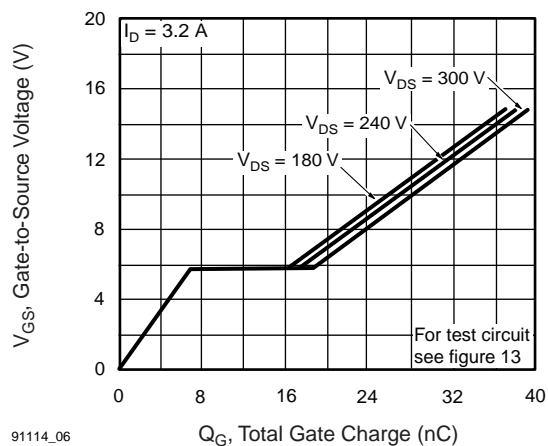


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

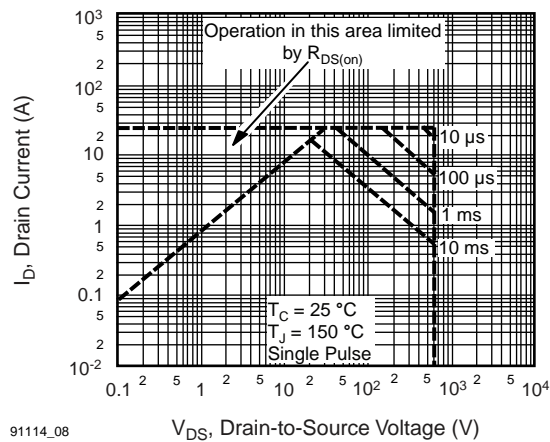
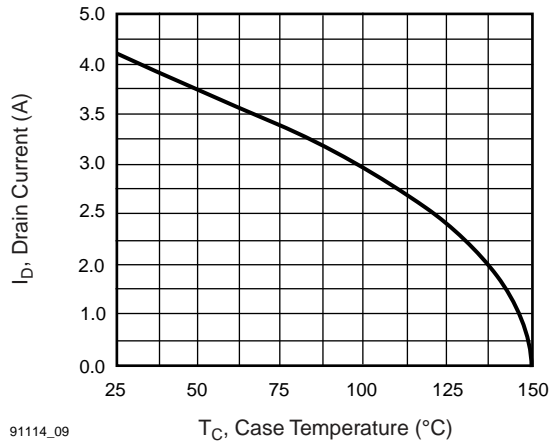


Fig. 8 - Maximum Safe Operating Area



91114_09

Fig. 9 - Maximum Drain Current vs. Case Temperature

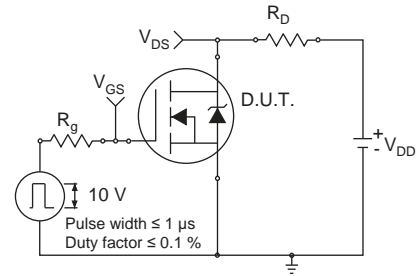


Fig. 10a - Switching Time Test Circuit

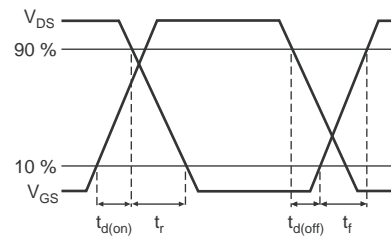
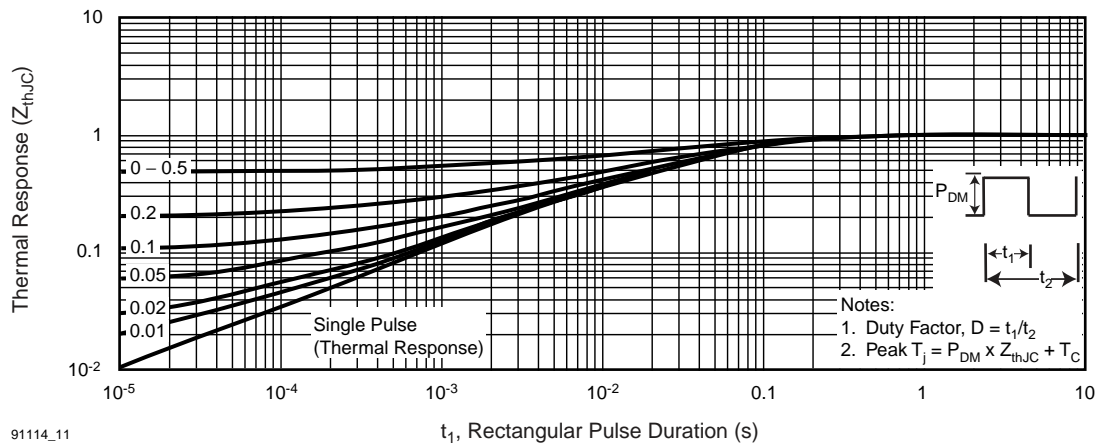


Fig. 10b - Switching Time Waveforms



91114_11

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

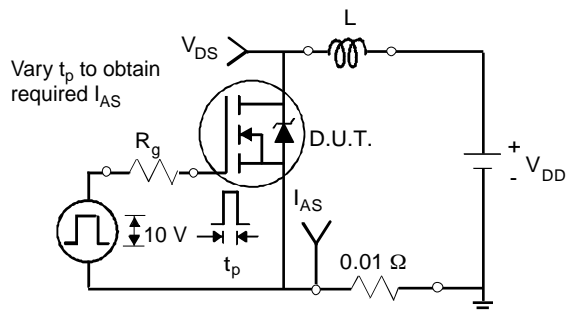


Fig. 12a - Unclamped Inductive Test Circuit

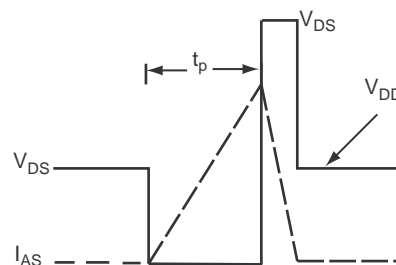


Fig. 12b - Unclamped Inductive Waveforms

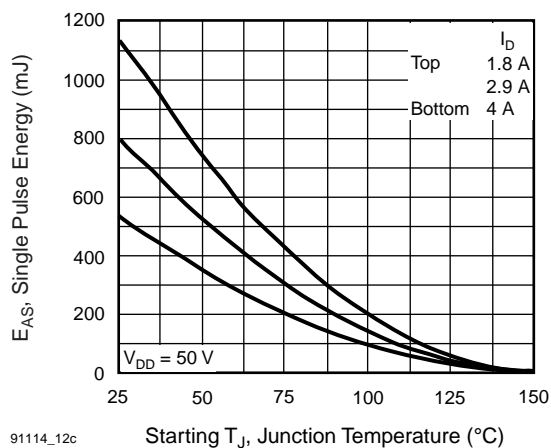


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

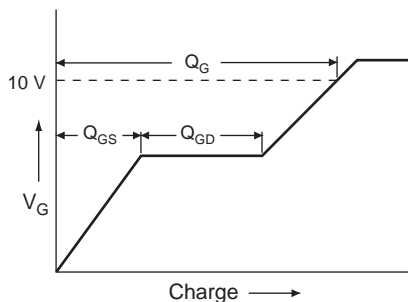


Fig. 13a - Basic Gate Charge Waveform

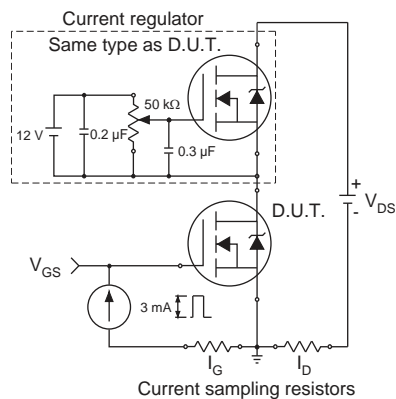


Fig. 13b - Gate Charge Test Circuit

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Din-Tek Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Din-Tek"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Din-Tek makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Din-Tek disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Din-Tek's knowledge of typical requirements that are often placed on Din-Tek products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Din-Tek's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Din-Tek products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Din-Tek product could result in personal injury or death. Customers using or selling Din-Tek products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Din-Tek personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Din-Tek. Product names and markings noted herein may be trademarks of their respective owners.

Material Category Policy

Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Din-Tek documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Din-Tek documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.