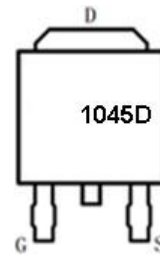
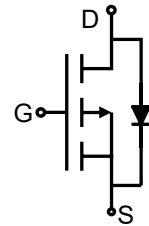


**Main Product Characteristics:**

$V_{DSS}$	-100V
$R_{DS(on)}$	36m $\Omega$ (typ.)
$I_D$	-30A



TO-252 (DPAK)

Marking and pin  
Assignment

Schematic diagram

**Features and Benefits:**

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature

**Description:**

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

**Absolute max Rating:**

Symbol	Parameter	Max.	Units
$I_D @ TC = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$ ①	-30	A
$I_{DM}$	Pulsed Drain Current ②	-120	
$P_D @ TC = 25^\circ C$	Power Dissipation ③	102	W
	Linear Derating Factor	0.82	W/°C
$V_{DS}$	Drain-Source Voltage	-100	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy @ L=0.1mH	106	mJ
$I_{AS}$	Avalanche Current @ L=0.1mH	46	A
$T_J T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	°C

## Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-case <sup>③</sup>	—	1.22	$^{\circ}C/W$
$R_{\theta JA}$	Junction-to-ambient ( $t \leq 10s$ ) <sup>④</sup>	—	6.2	$^{\circ}C/W$

## Electrical Characterizes @ $T_A=25^{\circ}C$ unless otherwise specified

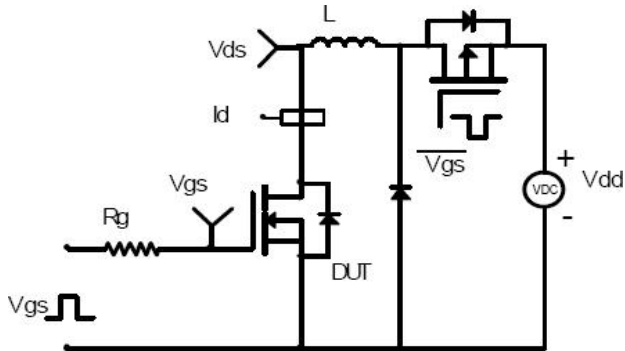
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	-100	—	—	V	$V_{GS} = 0V, I_D = -250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	36	45	m $\Omega$	$V_{GS} = -10V, I_D = -15A$
		—	39	55		$V_{GS} = -4.5V, I_D = -10A$
$V_{GS(th)}$	Gate threshold voltage	-1	—	-3	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$I_{DSS}$	Drain-to-Source leakage current	—	—	-1	$\mu A$	$V_{DS} = -100V, V_{GS} = 0V$
$I_{GSS}$	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 30V$
		—	—	-100		$V_{GS} = -30V$
$Q_g$	Total gate charge	—	90	—	nC	$I_D = -10A,$ $V_{DS} = -50V,$ $V_{GS} = -10V$
$Q_{gs}$	Gate-to-Source charge	—	15	—		
$Q_{gd}$	Gate-to-Drain("Miller") charge	—	11	—		
$t_{d(on)}$	Turn-on delay time	—	55	—	ns	$V_{GS} = -10V, V_{DS} = -50V,$ $R_{GEN} = 25\Omega$ $I_D = -5A$
$t_r$	Rise time	—	20	—		
$t_{d(off)}$	Turn-Off delay time	—	210	—		
$t_f$	Fall time	—	90	—		
$C_{iss}$	Input capacitance	—	7800	—	pF	$V_{GS} = 0V$ $V_{DS} = -25V$ $f = 1MHz$
$C_{oss}$	Output capacitance	—	222	—		
$C_{rss}$	Reverse transfer capacitance	—	165	—		

## Source-Drain Ratings and Characteristics

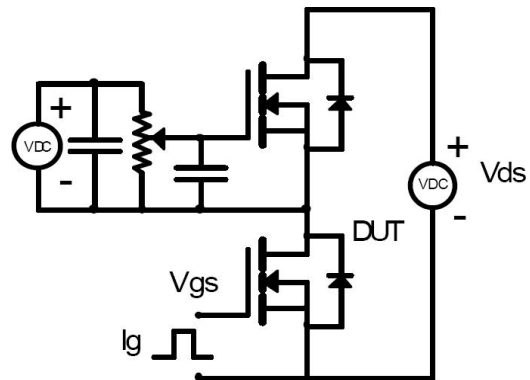
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-30	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode)	—	—	-60	A	
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$I_S = -6A, V_{GS} = 0V$

## Test circuits and Waveforms

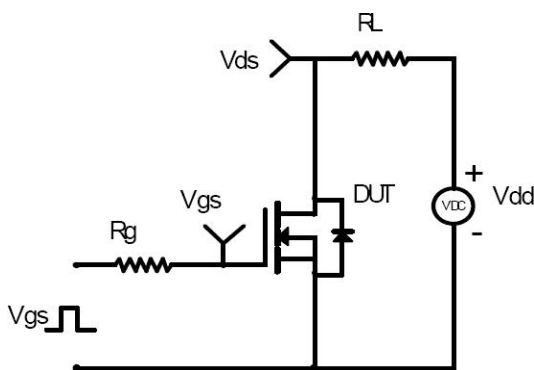
EAS Test Circuit:



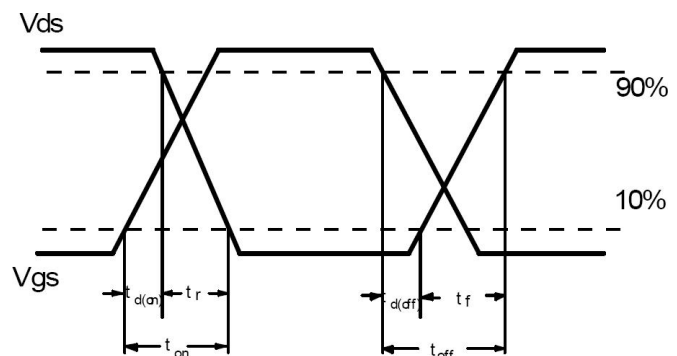
Gate charge test circuit:



Switching Time Test Circuit:



Switching Waveforms:



## Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$

### Typical electrical and thermal characteristics

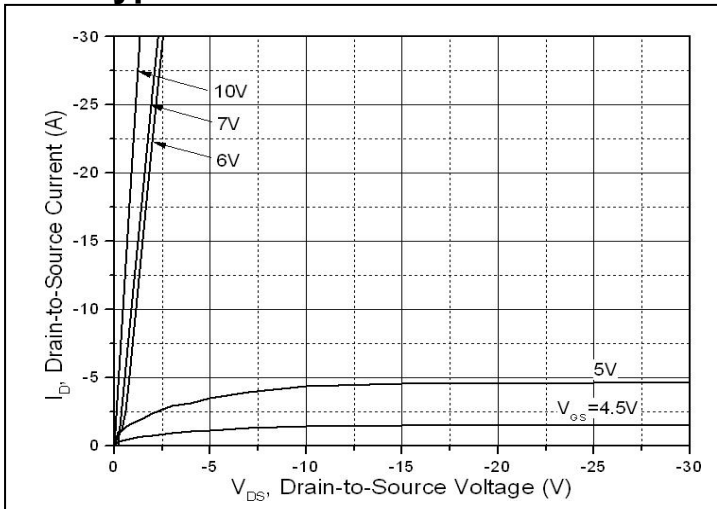


Figure 1: Typical Output Characteristics

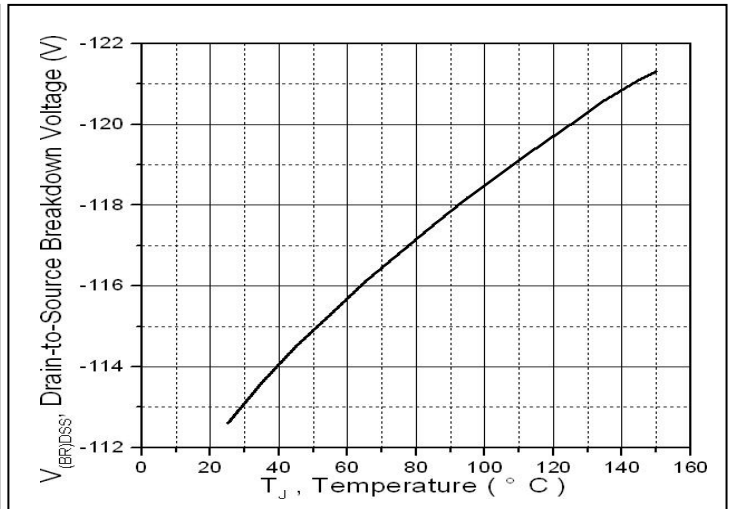


Figure 2: Drain-to-Source Breakdown Voltage vs. Temperature

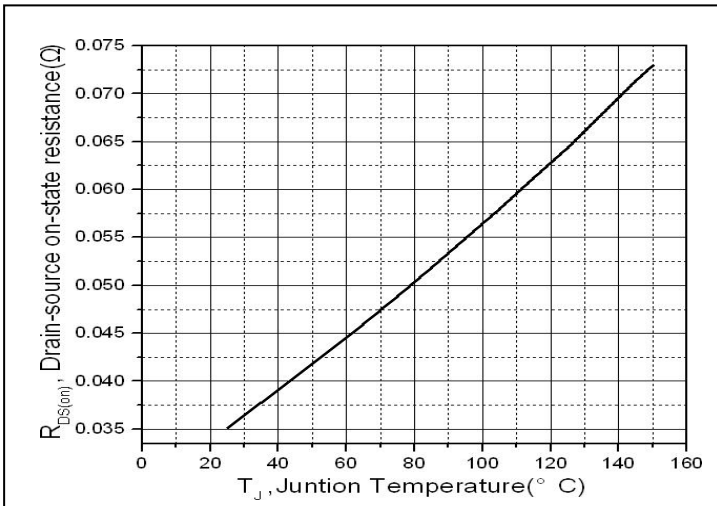


Figure 3: Normalized On-Resistance Vs. Case Temperature

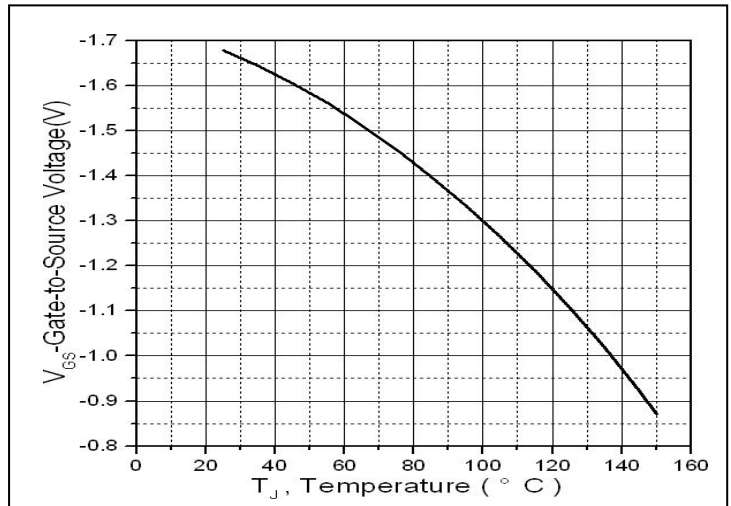


Figure 4: Gate to source cut-off voltage

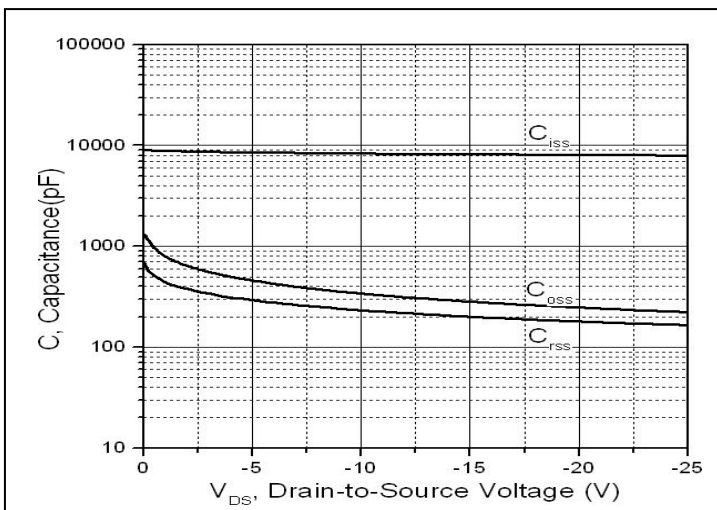


Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage

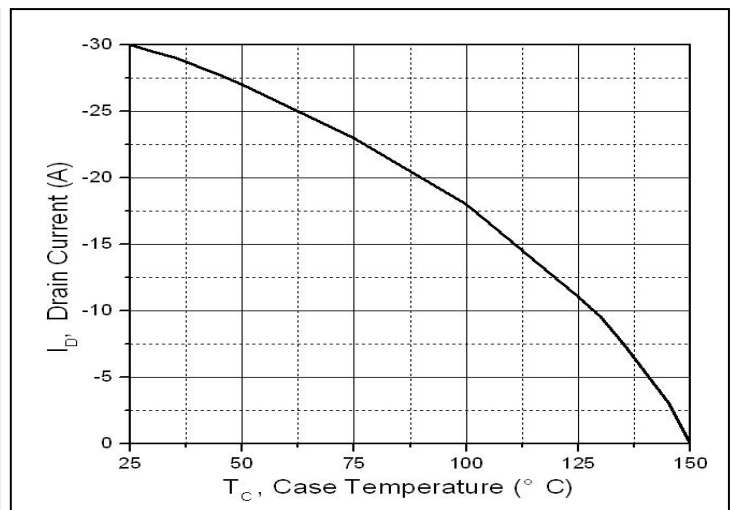
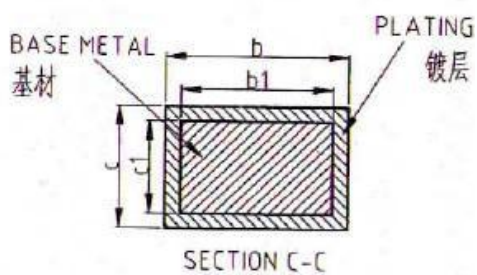
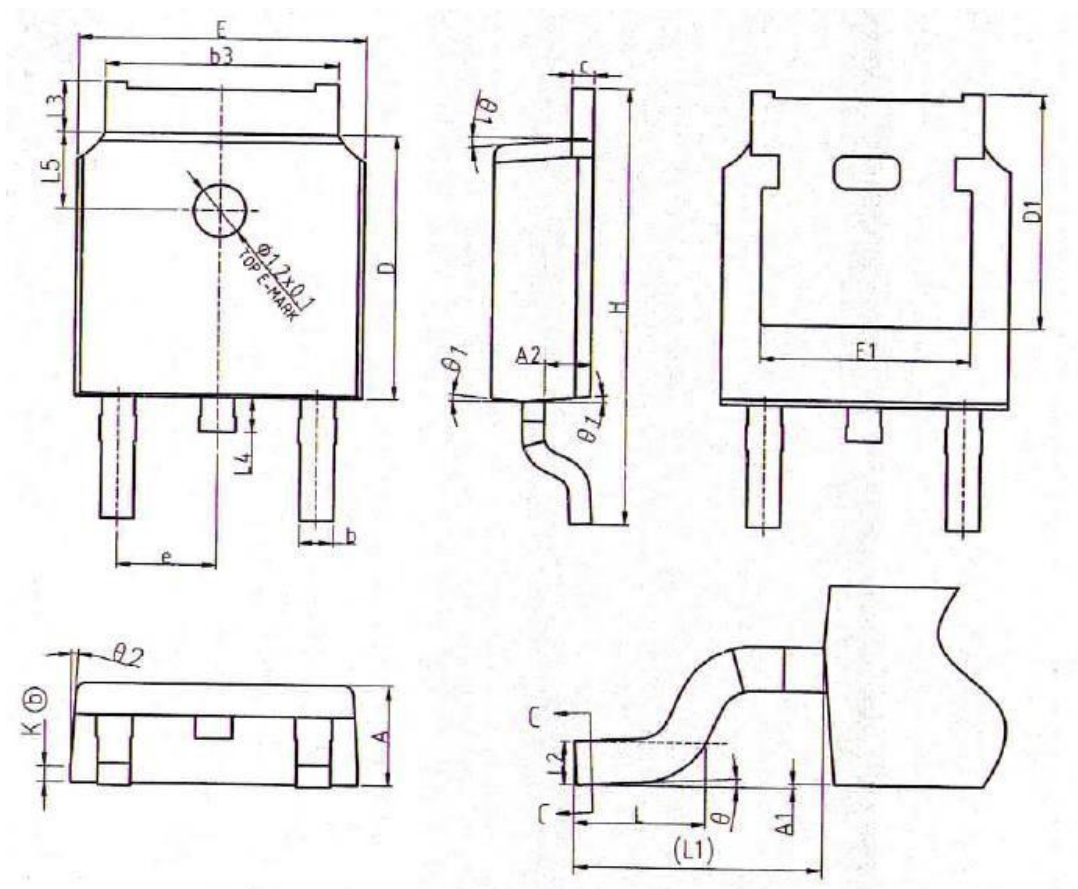


Figure 6: Maximum Drain Current Vs. Case Temperature

**Mechanical Data:**



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1	5.30REF		
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e	2.286BSC		
H	9.90	10.10	1030.00
L	1.40	1.50	1.70
L1	2.90REF		
L2	0.51BSC		
L3	0.90	-	1.25
L4	0.60	0.8	1.00
L5	1.70	1.8	1.90
$\theta$	0°	-	8°
$\theta 1$	5°	7°	9°
$\theta 2$	5°	7°	9°
K	0.40REF		

## Ordering and Marking Information

<b>Device Marking: 1045D</b>  <b>Package (Available)</b> <b>TO-252(DPAK)</b> <b>Operating Temperature Range</b> <b>C : -55 to 150 °C</b>
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## Devices per Unit

Package Type	Units/Tape	Tapes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
TO-252	2500	2	5000	7	35000
TO-252	2500	1	2500	10	25000
TO-252	800	5	4000	8	32000

## Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to $150^{\circ}\text{C}$ @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=150^{\circ}\text{C}$ @ 100% of Max $V_{GSS}$	168 hours 500 hours 1000 hours	3 lots x 77 devices