

POWER FIELD EFFECT TRANSISTOR

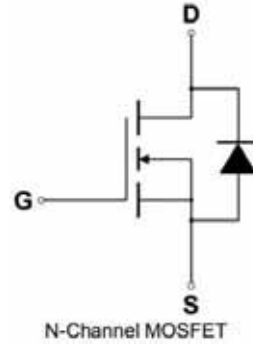
GENERAL DESCRIPTION

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

FEATURES

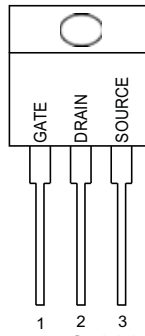
- ◆ Robust High Voltage Termination
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆ I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature
- ◆ Isolated Mounting Hole Reduces Mounting Hardware

SYMBOL



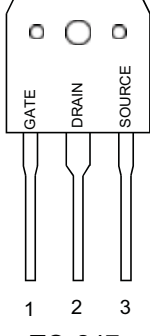
PIN CONFIGURATION

Top View



RM45N600T2

Top View



RM45N600T7

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current – Continuous	$I_{D 25C(1)}$	44.5	A
– Pulsed	$I_{D 100C(1)}$	28.2	
	I_{DM}	135	
Gate-to-Source Voltage – Continue	V_{GS}	± 30	V
Total Power Dissipation TO-220	P_D	50	W
TO-247		431	
Derate above 25°C TO-220		0.40	W/°C
TO-247	3.45		
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}$, $V_{GS} = 10\text{V}$, $I_L = 12\text{A}$, $L = 10\text{mH}$, $R_G = 25\Omega$)	E_{AS}	809	mJ
Thermal Resistance – Junction to Case TO-220	$R_{\theta JC}$	2.5	°C/W
– Junction to Case TO-247		0.29	
– Junction to Ambient TO-220	$R_{\theta JA}$	62.5	
– Junction to Ambient TO-247		40	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $T_J = 25^\circ\text{C}$.

Characteristic	Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$)	$V_{(BR)DSS}$	600			V
Drain-Source Leakage Current ($V_{DS} = 600\text{ V}$, $V_{GS} = 0\text{ V}$)	I_{DSS}			10	μA
Gate-Source Leakage Current-Forward ($V_{gsf} = 30\text{ V}$, $V_{DS} = 0\text{ V}$)	I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse ($V_{gsr} = -30\text{ V}$, $V_{DS} = 0\text{ V}$)	I_{GSSR}			100	nA
Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$)	$V_{GS(th)}$	2	3	4	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}$, $I_D = 15.6\text{A}$) *	$R_{DS(on)}$		75	90	m Ω
Gate resistance (f=1MHz, open drain)	R_G		3.6		Ω
Input Capacitance	$(V_{DS} = 100\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1.0\text{ MHz}$)	C_{iss}	2808		pF
Output Capacitance		C_{oss}	125		pF
Reverse Transfer Capacitance		C_{rss}	37		pF
Turn-On Delay Time	$(V_{DD} = 300\text{ V}$, $I_D = 45\text{ A}$, $R_G = 4.7\Omega$) *	$t_{d(on)}$	37		ns
Rise Time		t_r	106		ns
Turn-Off Delay Time		$t_{d(off)}$	95		ns
Fall Time		t_f	93		ns
Total Gate Charge	VDD=480V, ID=45A, VGS=10V	Q_g	69		nC
Gate-Source Charge		Q_{gs}	18		nC
Gate-Drain Charge		Q_{gd}	30		nC
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage(1)	$(I_S = 45\text{ A}$, $di_S/dt = 100\text{A}/\mu\text{s})$	V_{SD}		1.5	V
Forward Turn-On Time		t_{on}	**		ns
Reverse Recovery Time		t_{rr}	170		ns

* Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

** Negligible, Dominated by circuit inductance

RATING AND CHARACTERISTICS CURVES (RM45N600T7(T2))

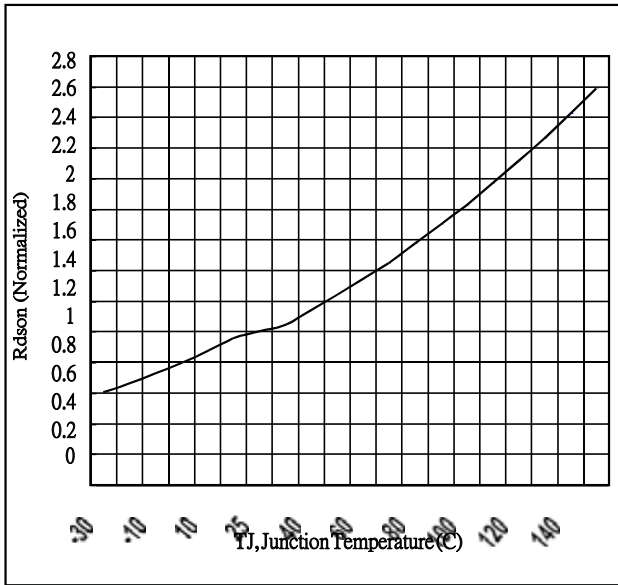


Fig 1. On-Resistance Variation with vs. Temperature

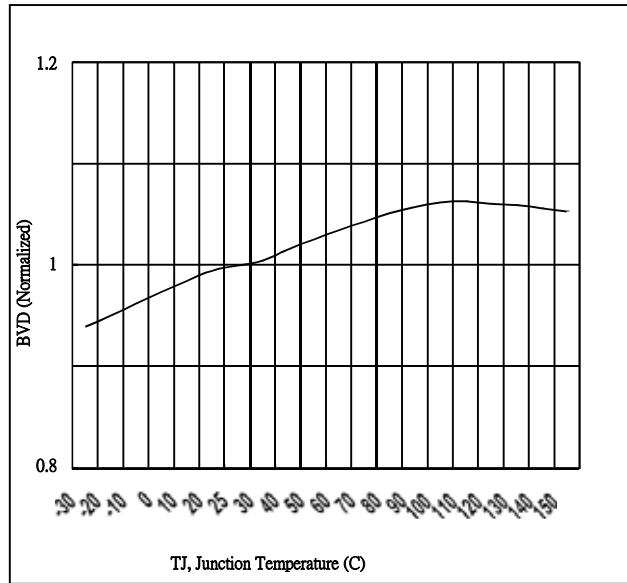


Fig.2 Breakdown Voltage Variation vs. Temperature

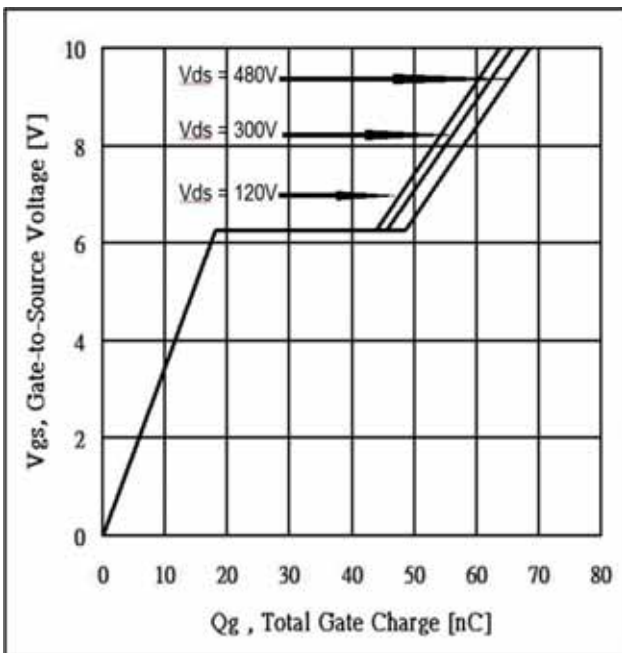


Fig 3. Typical Gate Charge vs. Gate-to-Source Voltage

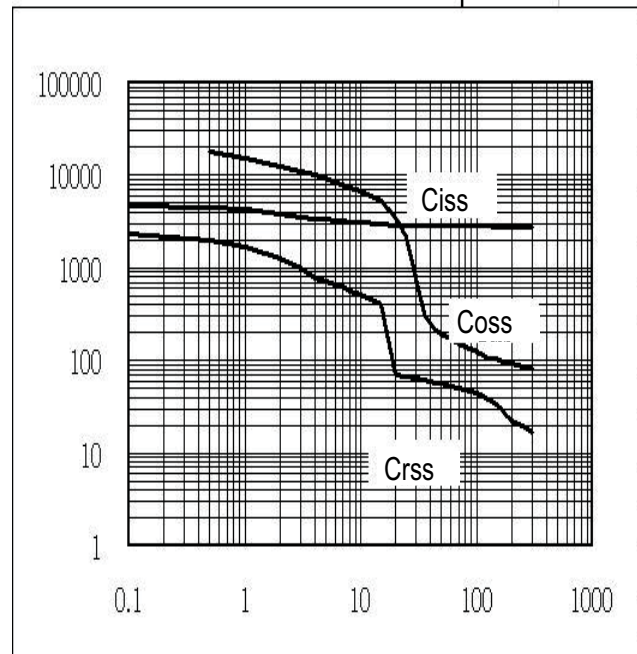


Fig 4. Typical Capacitance Vs. Drain-to-Source Voltage

RATING AND CHARACTERISTICS CURVES (RM45N600T7(T2))

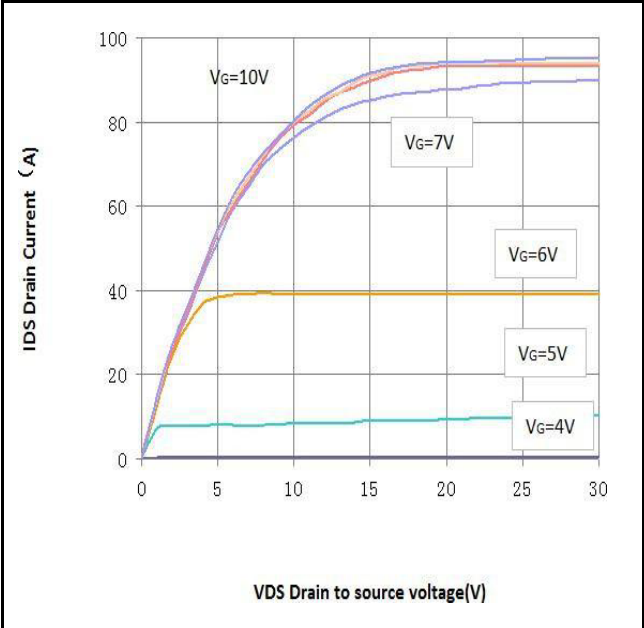


Fig 5. Typical Output Characteristics

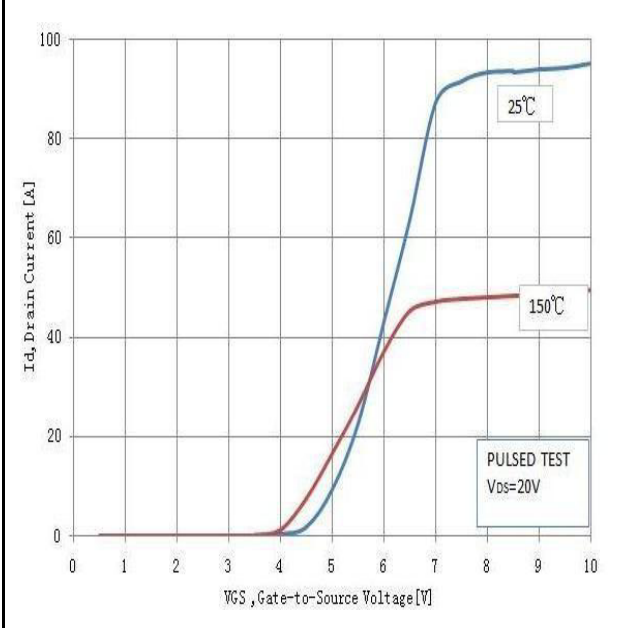
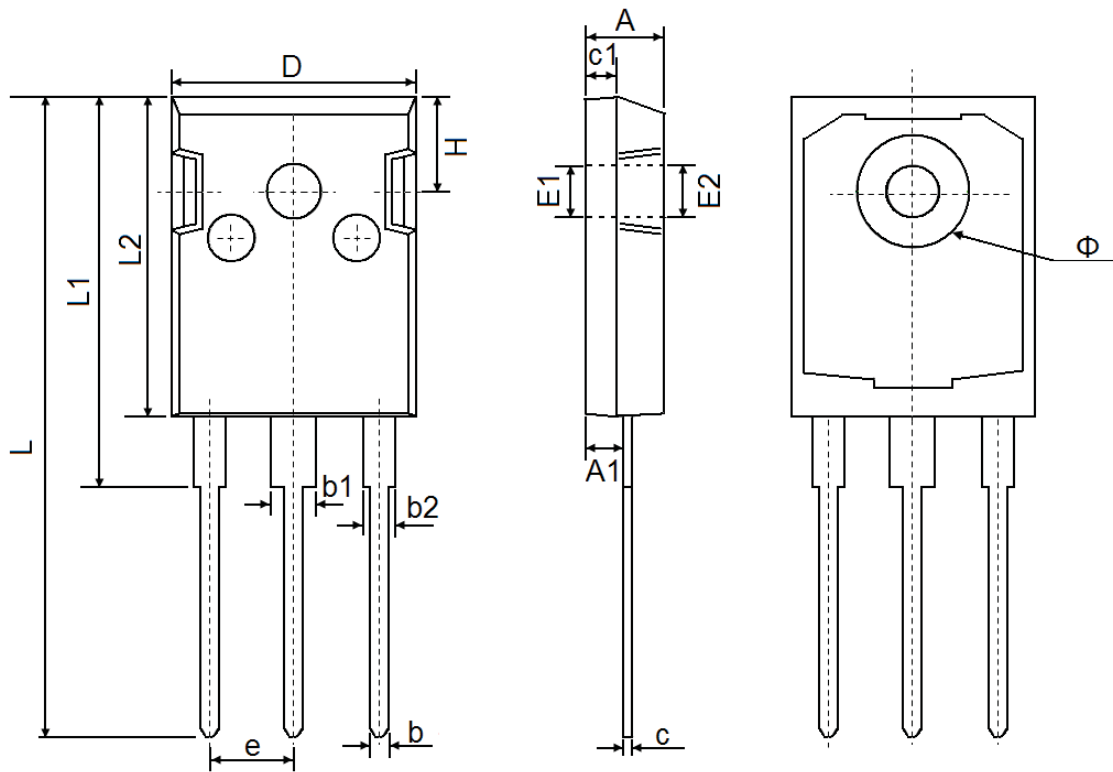


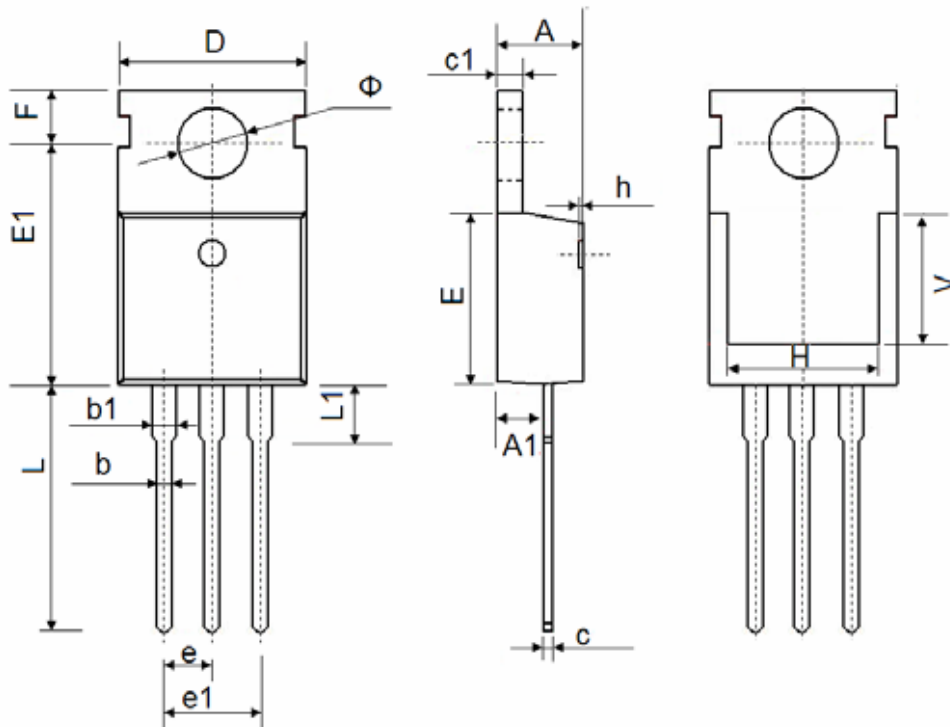
Fig 6. Typical Transfer Characteristics

TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
b2	1.800	2.200	0.071	0.087
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF		0.138 REF	
E2	3.600 REF		0.142 REF	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
ϕ	7.100	7.300	0.280	0.287
e	5.450 TYP		0.215 TYP	
H	5.980 REF		0.235 REF	

TO-220-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150

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