



Features

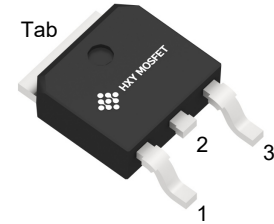
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to drive and parallel
- Effectively lower down T_j and R_{th} , High anti-EMI ability
- RoHS Compliant

Benefits

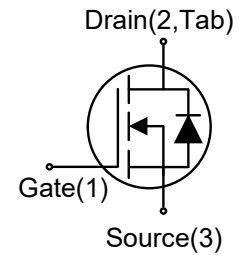
- Increased Power Density
- Faster Operating Frequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI

Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- Power Inverters
- High Voltage DC/DC Converters



TO-252-2L



Ordering Part Number	Package	Brand
IPD65R250E6XTMA1	TO-252-2L	HXY MOSFET

Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain - Source Voltage	650	V	
V_{GSmax}	Gate - Source Voltage (dynamic)	-5/+26	V	
V_{GSop}	Gate - Source Voltage (static)	0/+15	V	
I_D	Continuous Drain Current	20	A	$T_C = 25^\circ\text{C}$
		17.5		$T_C = 100^\circ\text{C}$
$I_{D(pulse)}$	Pulsed Drain Current	30	A	Pulse width t_p limited by T_{jmax}
P_D	Power Dissipation	52	W	$T_C = 25^\circ\text{C}$
		25		$T_C = 100^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$	



Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless other wise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650		850	V	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	
I_{DSS}	Zero Gate Voltage Drain Current		2	100	μA	$V_{GS} = 0\text{ V}$, $V_{DS} = 750\text{ V}$	
I_{GSS+}	Gate-Source Leakage Current			200	nA	$V_{DS} = 0\text{ V}$, $V_{GS} = +22\text{ V}$	
I_{GSS-}	Gate-Source Leakage Current			200	nA	$V_{DS} = 0\text{ V}$, $V_{GS} = -10\text{ V}$	
$V_{GS(th)}$	Gate Threshold Voltage	2.2	3.5	4.2	V	$V_{GS} = V_{DS}$, $I_{DS} = 1\text{ mA}$, $T_J = 25^\circ\text{C}$	Fig. 14
			2.6			$V_{GS} = V_{DS}$, $I_{DS} = 1\text{ mA}$, $T_J = 175^\circ\text{C}$	
$R_{DS(on)}$	Static Drain-Source On-Resistance		160	180	$\text{m}\Omega$	$V_{GS} = 15\text{ V}$, $I_D = 6\text{ A}$, $T_J = 25^\circ\text{C}$	Fig. 15
			195			$V_{GS} = 15\text{ V}$, $I_D = 6\text{ A}$, $T_J = 175^\circ\text{C}$	
C_{iss}	Input Capacitance		208		pF	$V_{DS} = 400\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	Fig. 8
C_{oss}	Output Capacitance		18				
C_{rss}	Reverse Transfer Capacitance		1.8				
Q_g	Total Gate Charge		10.6		nC	$V_{DD} = 400\text{ V}$, $V_{GS} = -5/18\text{ V}$, $I_D = 5\text{ A}$	Fig. 7
Q_{gs}	Gate-Source Charge		5.1				
Q_{gd}	Gate-Drain Charge		2.2				
$R_{G(int)}$	Gate Input Resistance		1.2		Ω	$f = 1\text{ MHz}$, $I_D = 0\text{ A}$	
E_{on}	Turn-On Switching Energy		25		μJ	$V_{DD} = 400\text{ V}$, $I_D = 5\text{ A}$, $R_G = 10\ \Omega$, $V_{GS} = -5/18\text{ V}$	Fig. 12
E_{off}	Turn-Off Switching Energy		10				
$t_{d(on)}$	Turn-On Delay Time		5		ns	$V_{DD} = 400\text{ V}$, $I_D = 5\text{ A}$, $R_G = 10\ \Omega$, $V_{GS} = -5/18\text{ V}$	
t_r	Rise Time		17				
$t_{d(off)}$	Turn-Off Delay Time		8				
t_f	Fall Time		10				



Reverse SiC Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.0		V	$V_{GS} = -4V, I_{SD} = 5A, T_J = 25^{\circ}C$	Fig. 16
		3.6			$V_{GS} = -4V, I_{SD} = 5A, T_J = 175^{\circ}C$	Fig. 17
$*I_{SD}$	Continuous Diode Forward Current		18	A	$T_C = 25^{\circ}C$	
			10		$T_C = 175^{\circ}C$	
t_{rr}	Reverse Recovery Time	50		ns	$I_{SD} = 5A, di/dt = 1000A/\mu s,$ $V_{DD} = 400V, V_{GS} = -5V$	
Q_{rr}	Reverse Recovery Charge	38		nC		
I_{RRM}	Peak Reverse Recovery Current	2.4		A		

* Depends on bonding wire

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Test Conditions	Note
R_{thJC}	Thermal Resistance from Junction to Case	2.88	$^{\circ}C/W$		Fig. 2
R_{thJA}	Thermal Resistance From Junction to Ambient	40			



Typical Performance

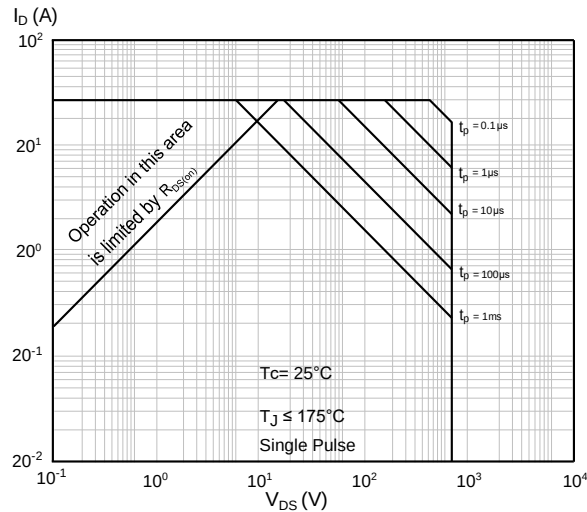


Figure 1. Safe Operating Area

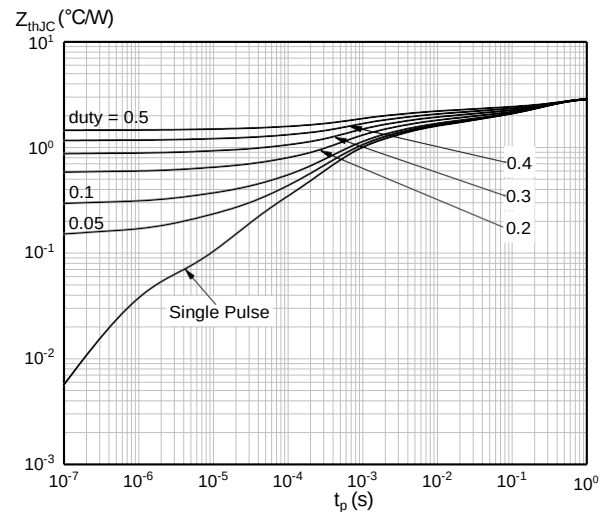


Figure 2. Maximum Transient Thermal Impedance

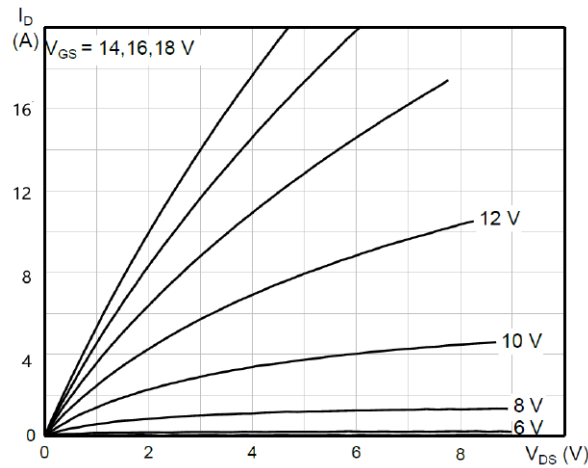


Figure 3. Typical Output Characteristics, $T_J = 25^\circ\text{C}$

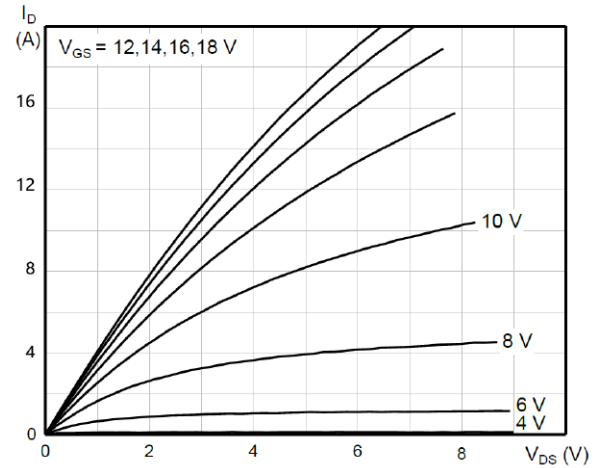


Figure 4. Typical Output Characteristics, $T_J = 175^\circ\text{C}$

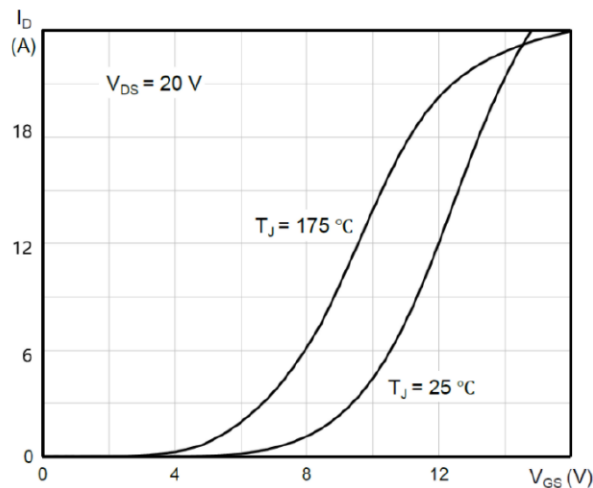


Figure 5. Typical Transfer Characteristics

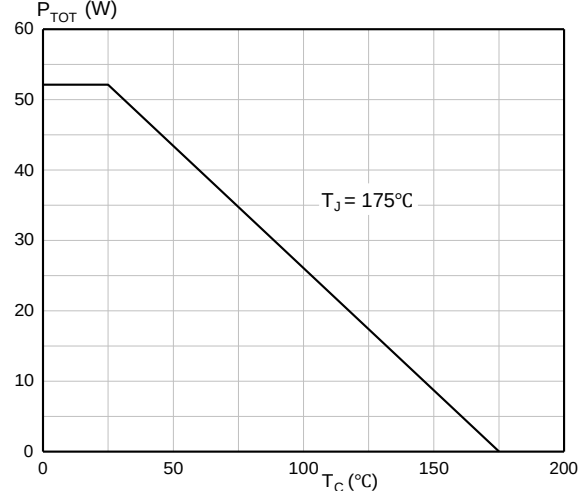
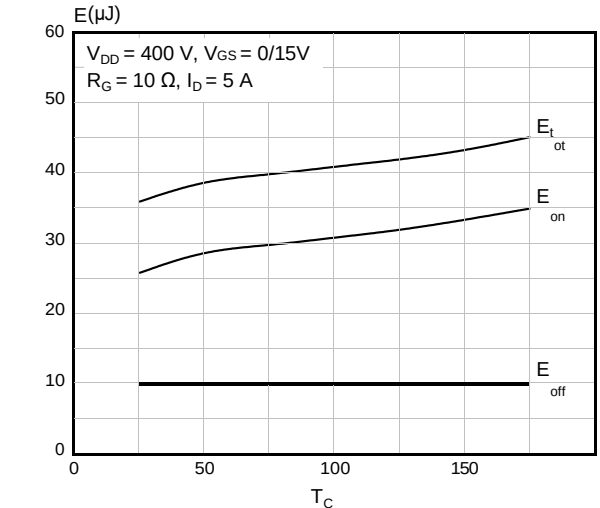
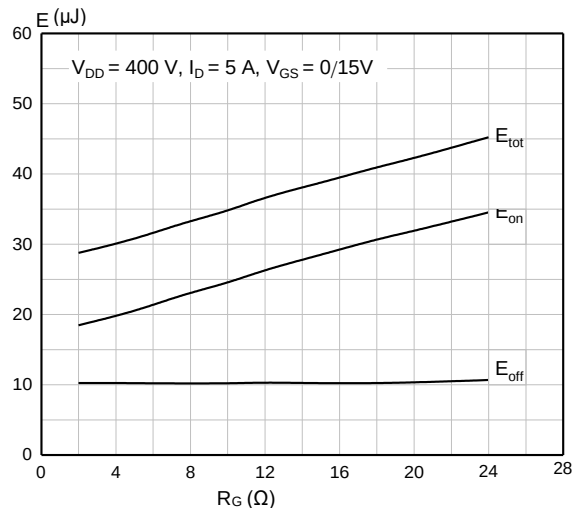
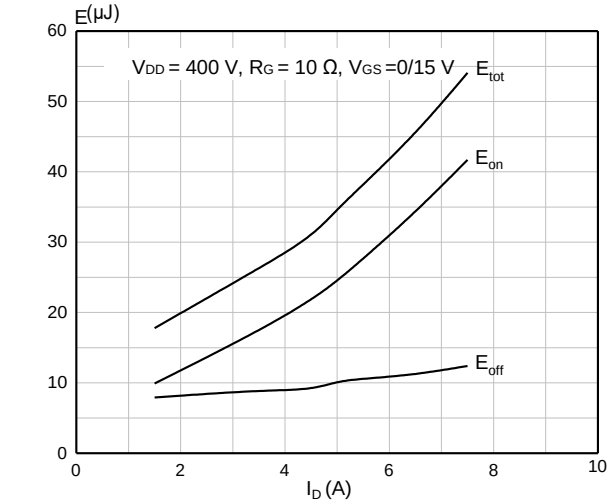
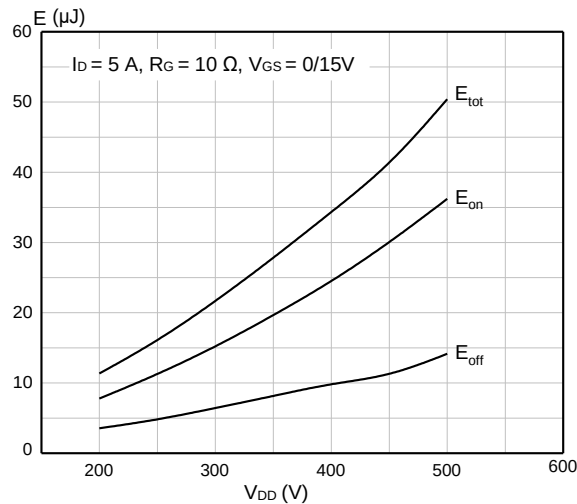
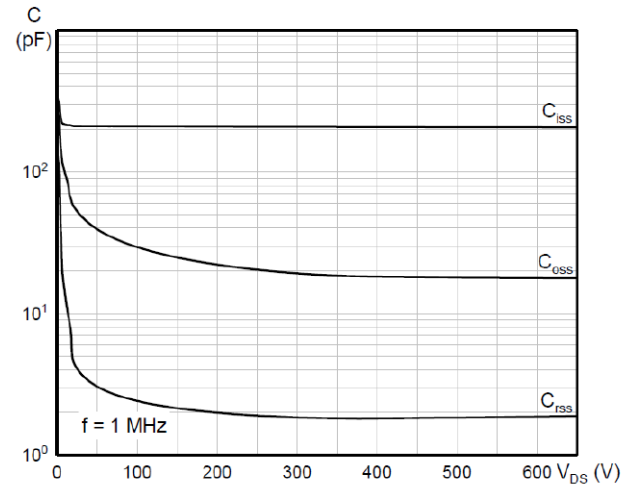
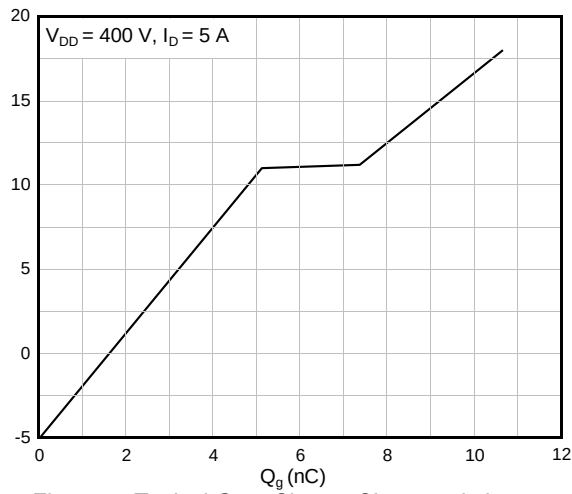


Figure 6. Total Power Dissipation



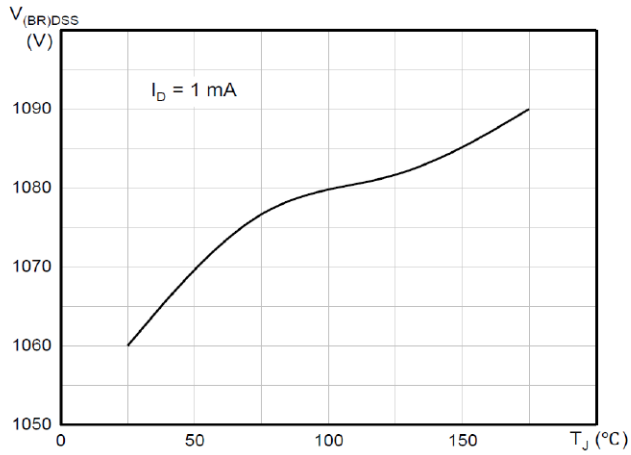


Figure 13. Breakdown Voltage vs. Temperature

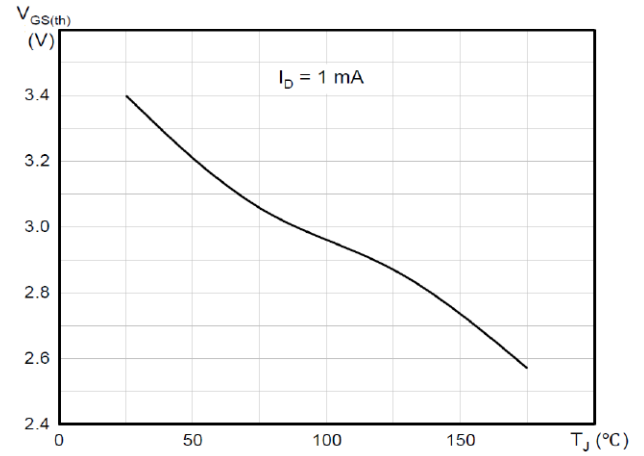


Figure 14. Gate Threshold vs. Temperature

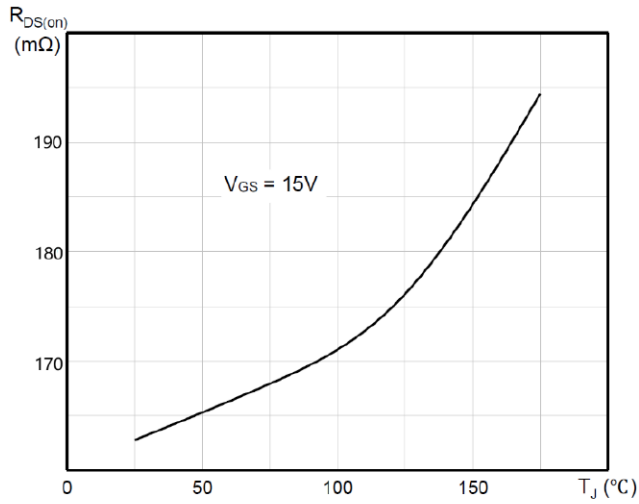


Figure 15. On-Resistance vs. Temperature

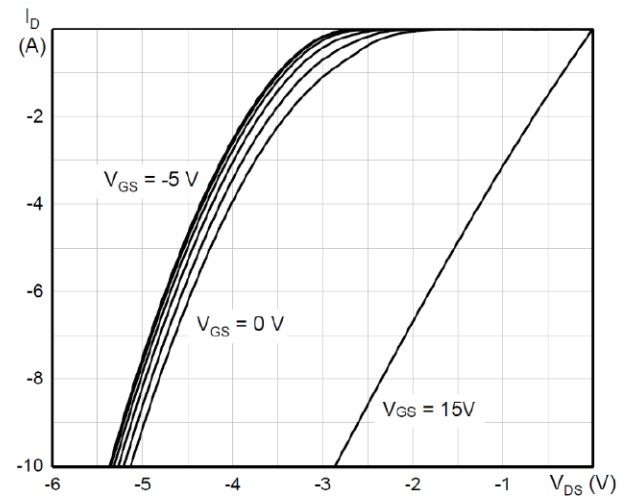
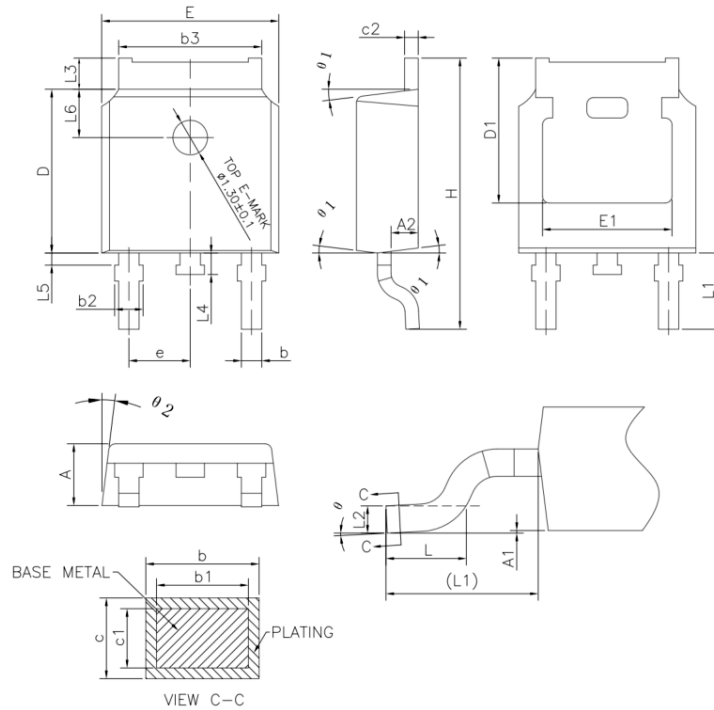


Figure 16. Body Diode Characteristics, T_J = 25°C



Package Dimensions

Package TO-252-2L



SYMBOL	Unit: mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	0.47	-	0.60
D	6.00	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80 REF		
θ	0°	-	8°
θ1	5°	7°	9°
θ2	5°	7°	9°



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